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THE NEW YORK BOTANICAL GARDEN

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Vol. 8, No. 1 MEMOIRS OF THE NEW YORK BOTANICAL GARDEN March 26, 1952

PLANT HUNTING IN ECUADOR

W. H. Camp

INTRODUCTION

Ecuador, a land characterized by sharp contrasts:- From this segment of the Roof of South America one can sometimes stand on the continental divide and see salt water; in one place—the Páramo des Soldados in Azuay—it is scarcely more than 30 miles to the Pacific, whereas rain falling on the eastern slope of this same páramo must travel over 3,000 tortuous miles until it mingles with the waters of the Atlantic. The great snow-covered mass of Chimborazo, aloof and refrigeratedly antiseptic, brooding almost atop the stinking, malarial-ridden tidal swamps of Los Ríos. Parched desert areas which penetrate the western escarpment of the Andes along the arid valley of the Río Catamayo to within a day's march of the dripping slopes of the eastern escarpment, where nobody knows how much rain falls (it is estimated to exceed 200 inches per year). A score of permanent snow fields athwart the equator. Typical alpine vegetation between the seasonal and permanent snowlines of Tungurahua, only a few hours walk from the dense tropical jungles of the valley of the Río Pastaza at its feet. Modern civilization superposed on a medieval feudal system and this, in turn, on an indigenous culture which archaeologists only now are beginning to admit goes back thousands of years beyond the recorded history of man; and the nearby eastern lowlands occupied by tribes yet scarcely emerged from a stone-age culture, where the wooden spear, its point fire-hardened, and poisoned dart still rule and where men still hunt each other, saving the heads of the vanquished—deboned and shrunken—as grisly trophies of the anthropean chase. Perhaps nowhere in the world has nature brought together so many sharp geographical contrasts in so small a space; perhaps nowhere has man permitted any greater cultural differences. The contrasts of climate and terrain are reflected in the varied richness of the vegetation; a full discussion of the archaeologic, ethnic and social situations of Ecuador are necessarily outside the province of this brief report.

It was my good fortune to spend nearly a year and a half in Ecuador. During the early years of World War II, I had been occupied with various problems related to the war emergency in other parts of Latin America—in the Caribbean area, in Central America, and Mexico. During this time I had been invited to join the group of workers searching for the quinine-yielding bark of the *Cinchona* tree, but was unable to do so until April, 1944. This phase of the work was then being carried out under the United States Foreign Economic Administration, successor to both the Board of Economic Warfare and Office of Economic Warfare; it was concluded under the U. S. Commercial Company. At the cessation of the official exploratory work of the *Misión de Cinchona del Ecuador* in April, 1945, I rejoined the staff of the New York Botanical Garden (having been on leave for three years) but continued in Ecuador, carrying out general plant explorations for essentially an additional six months.

It will be obvious that, during the year of official employment with the *Misión de Cinchona*, there was no opportunity to carry out either extensive or systematic general collections; our work was primarily concerned with searching for high-yielding stands of *Cinchona*, during which herbarium specimens were made of this and related genera on a fairly large scale. However, during the course of the work that first year there were occasions when a few specimens of general interest could be taken. There were moments for collecting to be snatched along the trail while the crew rested, or when the muledrivers paused to tighten the fastenings or rearrange the cargoes. There were brief hours after making camp while supper was being cooked and before the sudden falling of the equatorial night. Sundays, national holidays and certain Saint's Days of local importance, necessarily observed by the crews, also afforded opportunities for local field excursions of interest. Also there were long journeys by military "jeep." Anyone having ridden these useful vehicles over rough terrain will understand the necessity for occasional rest periods; one could just as easily rest cramped muscles while collecting a few specimens as by walking about idly.

At this point I should like to pay tribute to my three major assistants. The first to join me was Sr. Francisco Prieto. He came to me while my headquarters were in Loja. "Pancho" was from the San Marcos area northeast of Azogues in Cañar. Coming from a long line of Cholo cascarilleros, he knew the *Cinchona* barks of the southern part of Ecuador and took pains to teach me the lore of cascarilla bark hunting, as well as the multitudinous ways in which the bark was faked or diluted. He was a conscientious and excellent workman and completely to be trusted to operate alone. As a result he was often sent on special trips when it was not expedient to make up a full-scale expedition. He soon learned the art of arranging specimens and when once he learned that field notes were necessary, these also were forthcoming. His field book was a labor of love, painfully fashioned with much twisting of his mouth so as to better form the letters as they slowly evolved from the end of his pencil. The result was readable, but in a delightful mixture of Spanish and native Quechua, both spelled phonetically and according to the local variants of pronunciation. Recasting these notes from the local patois into Spanish and thence into English always was a pleasant occasion, for then Pancho would give me further insight into the folk-ways of his people.

Shortly after Pancho's arrival in Loja, Mr. Henning Jorgensen was hired by the central office in Quito. I had met him and asked that he be assigned to my crew. Jorgensen was a native of København, Denmark, but had been resident in Ecuador for some years. He had panned gold for a few years in the Oriente along the Río Zamora and its tributaries, where he had come into intimate contact with the Jivaros of the region. The welcome afforded us by the principal chief of the region when we had cause to explore in that area testified more than words to Jorgensen's character, for, on the whole, the white man is not welcome in the houses of the Jivaros. I never saw Jorgensen hurry at any task he was doing, yet he could turn out a prodigious amount of work, and by the simple expedient of sticking at it, regardless of the hour, until the task was done.

Early in August, 1944, my headquarters was transferred from Loja to Cuenca in the Province of Azuay. I took both Prieto and Jorgensen with me. In August, Sr. Manuel Giler was transferred from the crews working in the northern provinces and I requested that he be assigned to the Cuenca office. He became a valuable member of our exploratory crew. He had, if memory serves, originally been a cook on one of the northern crews; whatever he had been, I soon found that his talents lay elsewhere. He knew his way about among the usually inscrutable and devious small merchants in Cuenca, so he became our "expediter." If corrugated boxes were needed to pack specimens, he always knew where to locate them, even in establishments where I had been gravely—even sorrowfully—assured that none was available. If a camion was needed to truck our gear and ourselves to the "jumping off" place of an expedition, it was Giler who would arrange for the hire of the vehicle. He had a way of getting them at local prices and also an uncanny ability to pick one in sufficient repair to take us to our destination without undue delays because of recurrent break-down, no mean feat in itself for to me each looked as if it scarcely could limp another mile.

In many ways the three were a remarkable crew. They were individualists to the core and with very different personalities, each equally capable of working alone. Yet when they worked as a group the special talents of each were so complementary that they functioned as an effective whole. No *jefe de expedición* could ask for more.

There is little point here in detailing the various comings and goings of our hunt for *Cinchona.* There were trips by muleback into the eastern Cordillera—across the Cordillera de Zamora and into the valley of the Río Zamora, where my first contact with the Jivaros was made. It was an eerie experience. I was alone, ahead of the party and just off the trail examining some minute Peperomias. There was a chattering ahead and I saw a small band coming toward me, naked except for their loin cloths, their spears, blow-guns, and quivers of poisoned darts. They spied me in the shadows at a distance of about 30 paces. They stopped, seemingly in mid-step, and almost before one's eyes silently melted into the jungle on either side of the trail, completely disappearing from sight. Although I could not see them I knew they were watching me. I therefore went on with my work as if I had not seen them, for long ago I learned that such people will tolerate a person collecting plants. It is a thing they understand, for they also collect plants, for food, for medicine, and for their arts. We were soon to make friends with this group.

There were trips across several ranges of the Andes to Zaruma and beyond. At Zaruma in the Province of El Oro they still mine for gold from the same mother lode from which the ancient Incan miners took the metal. There were trips by Jeep between Loja and Cuenca, using the still incomplete Pan-American Highway. There were trips when one crossed through the Paso Cajanuma, perhaps the *de facto* type locality of the genus *Cinchona*; a few sprout trees of *corteza fina*, the real *C. officinalis*, still may be encountered there. At least tradition has it that the first European to be cured of intermittent fever by the use of cascarilla bark was in the tiny village of Malacatos, which nestles at the foot of this rugged mountain pass in the southern part of the Province of Loja.

THE CUTUCU

Once, while I was working on the escarpment east of Cuenca, the weather was sufficiently clear so that one could see further toward the Amazonian lowlands. Ahead in the blue mists there loomed yet another but lower range. It was the Cordillera Cutucú. A hasty instrumentation indicated that its upper slopes and crest ought to be at about the correct altitude to sustain certain types of high-yielding barks for which we were especially searching. As a result permission was granted to organize a special expedition to investigate this little known area. The local governmental officials in Cuenca washed their hands of the affair. It was in the Oriente, outside their jurisdiction. Later, at Mendez, the commandante of the local outpost garrison shrugged his shoulders and wished me luck. There was reason for this indifference. There is gold to be panned in the rivers of the region. Only several years previous the Jivaros had become tired of the gold miners in their territory, of their insolence, their disregard for personal rights, their many attempts to violate the Jivaro women, and the murder of the men when such actions were protested. The Jivaros planned it carefully and one morning they descended on the miners scattered through the region and in about two hours liquidated nearly 30 of the intruders.

A detachment of the Ecuadorean army was sent in to catch and punish the "outlaw savages." They burned a few houses, and tore up a few gardens, but didn't catch a single Jivaro. In return, the Jivaros dealt with the army in their own fashion. They efficiently worked a "platoon system" of replacements and so got ample rest. For the army detachment, sleep at night was impossible for there were constant alarms from all quarters. Sleep during the day was equally out of the question for, if a soldier drowsed, a spear would strike the ground nearby, tip over and slap him on the head (the Jivaros are excellent spearsmen). Sentries posted to guard a group trying to get some sleep could see the deadly poisoned darts zipping by, or setting themselves perilously close in the bark of the tree against which they might be leaning. They would then fire their rifles blindly into the jungle gloom, only to get back an echo of mocking laughter. Not a soldier was ever nicked, so careful was the aim of the Jivaro warriors. At the end of a week the army retired from the scene, routed not by wounds and loss of blood, but with hurt pride and loss of sleep. Some months later, to save face on both sides, the Jivaros turned one of their men over to the officials, stating that he was the one to be punished, since he had been the instigator of the affair. (Later, while with them and after gaining their confidence, I was told with a sly wink that they were only too glad to make the deal; the fellow was a chronic troublemaker and they had been waiting for some excuse—under their own "laws"—to get rid of him.) It was this group of Jivaros around the base of the Cutucú which had been concerned with the "uprising" and I was gravely assured that it was very dangerous to enter their territory so soon after the "massacre."

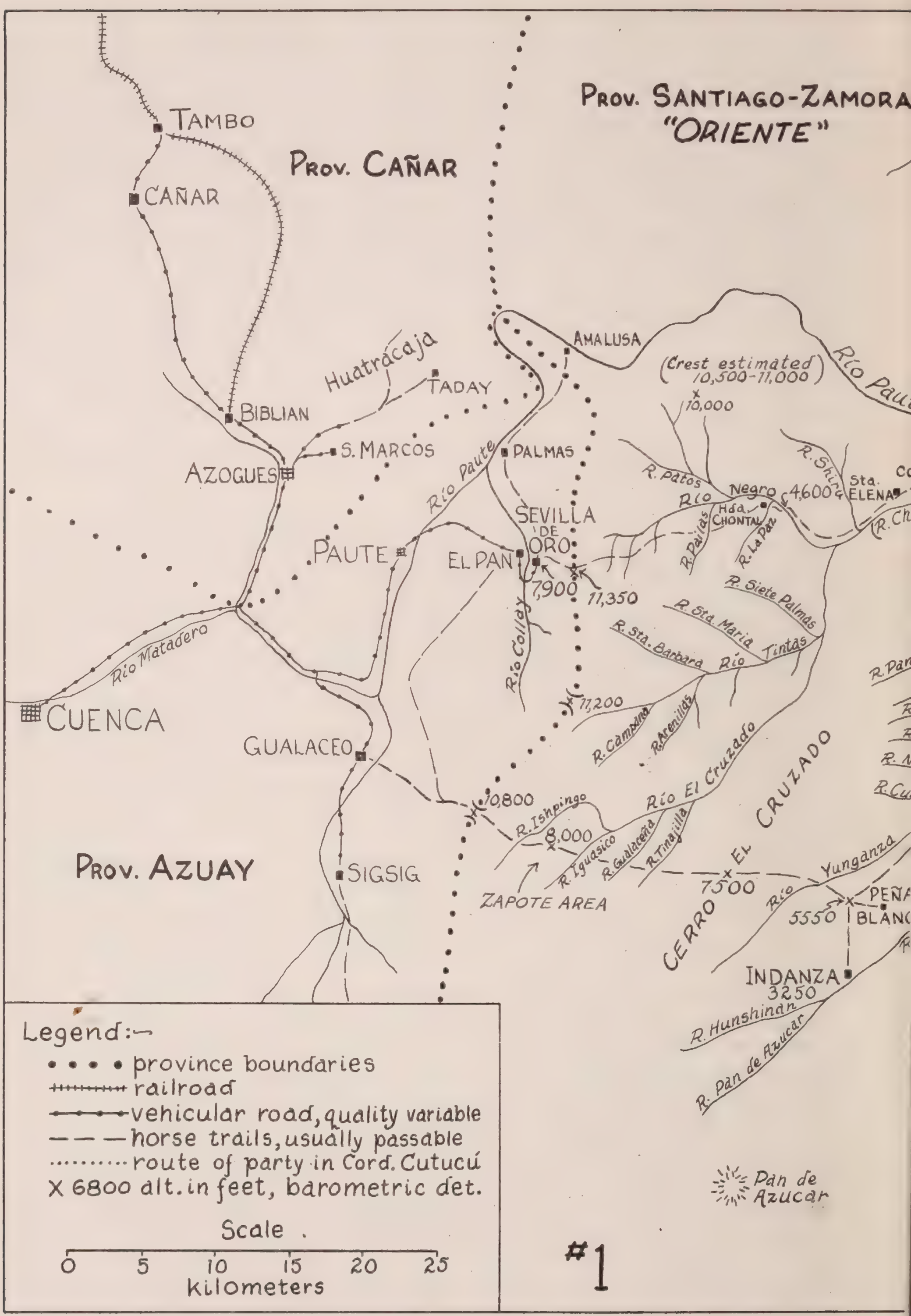
Leaving from Cuenca, we took the trail across the Cordillera from El Pan to Mendez. From Mendez northward along the Río Upano we had been making increasingly frequent contacts with the Jivaros. Finally, near the confluence of the Chupiantza with this stream, we settled down to make ourselves really acquainted. After several days spent in parley with the chief of the area, Jorgensen and I were invited to move across the stream and spend the night in his house. Here was the first step, but the real problem was to open the way for the band of Cholo assistants we had brought with us for, in general, it was death for a Cholo to set foot in the territory of the Jivaros. This finally was arranged and I split my group: one part under the leadership of Prieto was to stay on the west bank of the Upano, to take care of the mules and tend the driers; the other to ascend the Cutucú to assist there and also relay back the undried specimens to Prieto as we collected them. This was a necessity, since there were no real trails into the Cutucú and I had been unable to get any of the Jivaros to act as carriers. However, several agreed to go along, and by the time it ended we had quite a party, with a group of men, several of their wives and nursing babies, and a string of 'teen-aged hunters, already wise in the lore of the jungle. Arriving several days later in the central part of the Cutucú we set up base camp, the Jivaros on one side of the little river and we on the other. During the days the Jivaros went about their business of fishing and hunting monkeys, and we went about our business of hunting for the fever-bark tree. In the evenings, we visited back and forth.

My great regret was that I had picked up so few words of Jivaro. Fortunately Patéhi, my favorite of all the group, could speak a little Spanish, and so we would sit long hours either by my fire or his and slowly piece out a conversation. Jorgensen had taken several of the spare men and crossed the Cutucú into the basin of the Río Yapi. The Cholo runner supposed to bring in extra supplies had not arrived (I was to learn later that he had fallen ill and was unable to make the long haul). And the remaining Cholo runner in the Cutucú camp was ill and unable to carry a load out and inform Prieto of the situation. We had stayed longer than expected and so our food supply was seriously depleted. The Jivaros had not been having much luck with their hunting and I did not feel like asking them to share. Apparently Patéhi had sensed all this, although we had not discussed it.

Early one morning he crossed over to our side and asked the ill man if he could walk out if helped while crossing the rivers. The man was glad enough to make a try of it, and so Patéhi turned to me and indicated that I was to make the specimens into a pack. He adjusted his long braids so as to be a pad for the tump-line, swung it up, and the two of them went off down the trail. I estimated that it would be three days at the least before he could return, but he was back in half the time I had anticipated, and with a staggering load of yuca roots and sweet potatoes from his own garden. He was scornful when I offered to pay him either in money or in trade goods, but beamed knowingly when I later presented his three wives with special lengths of trade cloth and a handful of trinkets and fine-toothed combs. Nobility of spirit is neither a product of civilization nor a character of any race; it is an individual trait, as likely to be found in a naked savage as in a well-garbed saint. For healthy realism and true understanding, my money would be on the naked savage.

The Cutucú is a wild and tumbled range. Altimetric measurements placed the pass to the east above base-camp at 6,500 ft.; the adjacent tops went approximately 500 ft. higher. Therefore, as part of the general Andean orogenic system it is not high, but has as rugged a terrain as any I encountered in Ecuador. Also it has a feature I found nowhere else. As one approaches the central backbone of the complex, the ridges become very sharp. One naturally would expect a lessening of the vegetation on these sharp, over-drained ridges. However, this is generally not the case because of the abundant precipitation. We worked in the Cutucú from mid-November to mid-December, supposedly the "dry" season, but fogs were a common feature, there was scarcely a day when there was not heavy rain, and on several occasions there were actual cloudbursts. This constant moisture leads to the development of heavy vegetation, even on the sharp, knife-edge ridges. Quite often these were the only places to ascend, if one did not wish to try working up the stream beds—sometimes hazardous because of the swift water and large boulders. At times the mat of vegetation on the edges of these ridges was actually T-shaped, flat on top and projecting laterally from the apex of the ridge. In such places it was an easy matter to thrust one's leg through this mat only to find it dangling in space; an unwary step too near the edge and a piece could break loose, projecting one onto the steep and rocky slopes below.

Perhaps I am prejudiced in favor of the Cutucú, but to me it stands out as the floristically richest small range I have ever studied. This, in my opinion, is the result of the high humidity, the geological background, and constant disturbance of the vegetation. The amount of precipitation, even in the so-called "dry" season, has already been mentioned. As nearly as I could judge, the Cutucú is primarily fashioned from sedimentary rocks, although some of the boulders appeared to be partly metamorphic; of the sedimentaries, both sandstone and limestone are present, the limestone at times quite fossiliferous. There also appear to be some intrusive rocks. This jumble of variant rock materials produced sharp differences in both chemical and physical characters of the substrate which provide a multitude of micro-habitats. The disturbance is not man-made; the physiographically youthful terrain is constantly undergoing erosion and is subject to both earth and rock slides, so that one is constantly encountering stretches running the gamut from raw talus to stabilized forest. The sharp ridges offer other variant habitats,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S. MARCOS
AZOGUES
Río Paute
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AMALUSA
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Río Negro
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R. Siete Palmas
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R. Sta. Barbara
Río Tintas
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Río Collay
Río Matadero
CUENCA
GUALACEO
11,200
R. Campana
R. Arenillas
Río El Cruzado
CRUZADO
R. N
R. Cu
10,800
R. Ishpingo
8,000
R. Iguasico
R. Gualaceña
R. Tinajilla
ZAPOTE AREA
PROV. AZUAY
SIGSIG
7500
CERRO EL CRUZADO
Río Yunganza
PEÑA
BLANC
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INDANZA
3250
R. Hunshinan
R. Pan de Azucar
Pan de Azucar
Legend:—
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vehicular road, quality variable
— — — horse trails, usually passable
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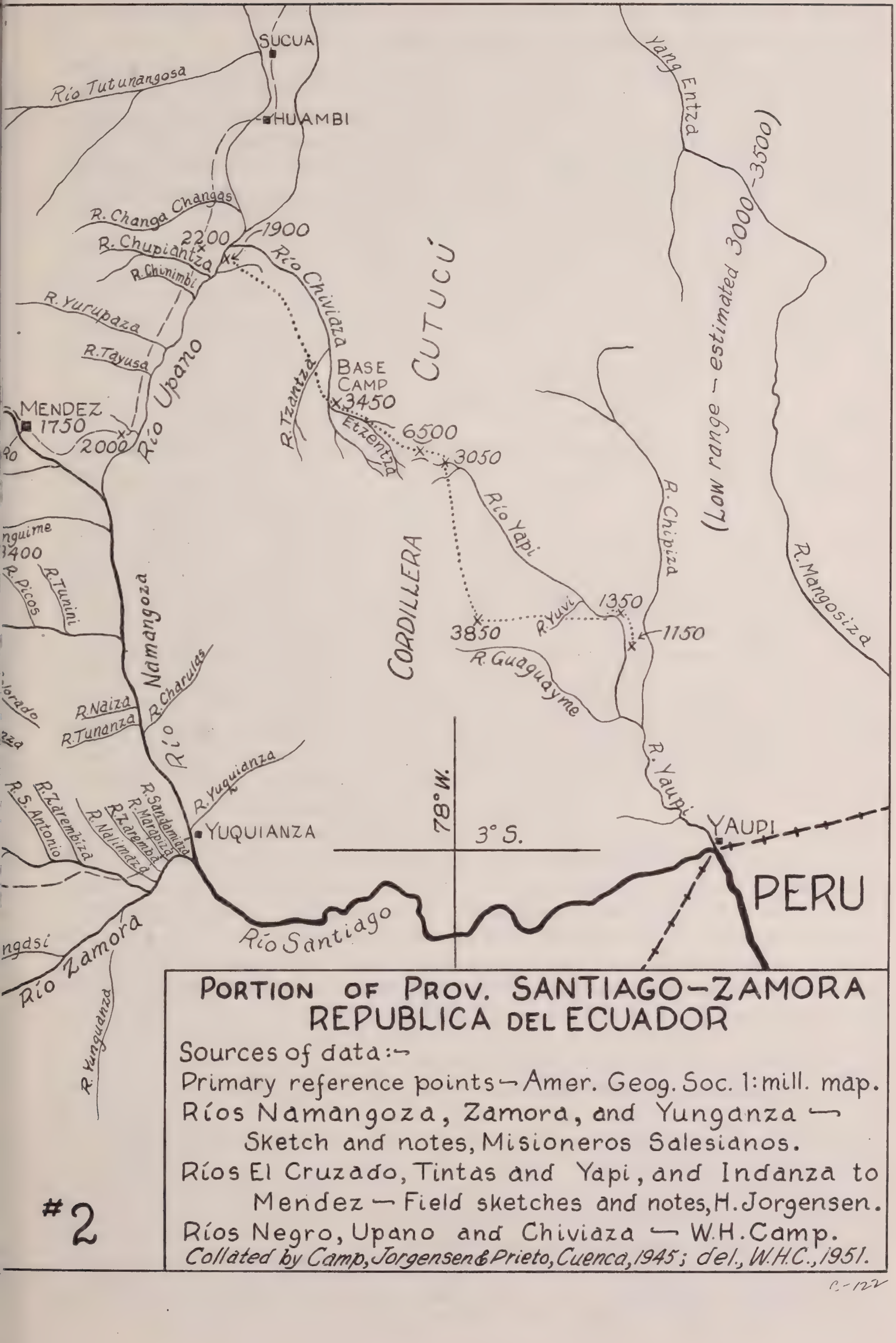
SUCUA
Río Tutunangosa
HUAMBI
R. Changa Changas
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1900
R. Chupiantza
R. Chinimbi
Río Chiviaza
R. Yurupaza
R. Tayusa
Río Upano
MENDEZ
1750
2000
R. Tzantza
BASE CAMP
3450
Etzentza
6500
3050
CUTUCÚ
CORDILLERA
Río Yapi
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3400
R. Picos
R. Tunini
Namangoza
Río
R. Naiza
R. Tunanza
R. Charulas
R. Yuvi
1350
1150
3850
R. Guaguayme
R. Chipiza
Yang Entza
(Low range – estimated 3000–3500)
R. Mangosiza
R. Yaupi
YAUPI
PERU
78° W.
3° S.
R. Yuquianza
YUQUIANZA
R. Sandamiaza
R. Marapiza
R. Zarembiza
R. Nalimbiza
R. S. Antonio
Río Santiago
Río Zamora
ngdsi
R. Yunganza

PORTION OF PROV. SANTIAGO–ZAMORA
REPUBLICA DEL ECUADOR

Sources of data:–

Primary reference points – Amer. Geog. Soc. 1: mill. map.

Ríos Namangoza, Zamora, and Yunganza – Sketch and notes, Misioneros Salesianos.

Ríos El Cruzado, Tintas and Yapi, and Indanza to Mendez – Field sketches and notes, H. Jorgensen.

Ríos Negro, Upano and Chiviaza – W.H. Camp.

Collated by Camp, Jorgensen & Prieto, Cuenca, 1945; del., W.H.C., 1951.

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and the valley bottoms may be mud flats, sand banks, or narrow boulder-strewn corridors, interspersed with massive, overhanging rocky ledges.

The thing immediately obvious in this ever-changing series of habitats was the great abundance of species and the relatively few individuals of each. This is not true of the steep Andean escarpments, or for that matter of the outer slopes of the Cutucú. Duplicate specimens sometimes were a problem. Among the Rubiaceae, the gaudily flowered Palicoureas offered no problem, since they are shrubs and trees. But the ubiquitous and somewhat more herbaceous Psychotrias sometimes were most vexatious, for it seemed that no two were exactly alike. In the herbaceous members of other families one might see a small but seemingly vigorous colony of some sort growing in the moss atop a boulder. There were hundreds of moss-covered boulders in the same area, all seemingly alike—but it was unusual to find another colony of the same plant. It was an amazingly complex flora and it hurt mightily not to be able to make a clean sweep of samples from it. But our job was hunting *Cinchona*.

As I had anticipated, we did find *Cinchona* on the upper slopes and top of the Cutucú. Some of it was worthless; other samples gave quite good analyses, the latter in my opinion being related to the Calisaya type from much farther south in the Andes. But unlike the Cinchonas of the Andean slopes, which grow in "manchas" or colonies, those of the Cutucú occurred as occasional, scattered trees. In this they were consistent with the rest of the flora there. At the time I was deeply disappointed. On later reflection I was rather glad of it. The Jivaros would not have demeaned themselves by stooping to the type of labor necessary to harvest the bark, and the importation of Cholo cascarilleros from the Andean uplands would only have caused bloody trouble here in the center of the Jivaro territory.

One cannot leave this part of the narrative without at least further brief mention of the Jivaros themselves. At times they have been grossly maligned by those writers who have been on the fringes of their territory, and whose knowledge of them is based largely on hearsay, by brief contact as they happen to come into the few places available to them for trade, or, worse yet, by those outcasts and loafers that congregate about the few missions. It is only after one actually has known the Jivaros of the eastern lowlands, hunted with them, and lived for some time in their homes, that their true character is evident. They are a proud and stiff-backed race and, so far as my knowledge goes, have never been conquered or subdued. (The much-publicized "Colorados" of the lowlands west of Quito are a different race, now drunken and debauched.) The Spaniards early founded cities in the Oriente, expecting to make slaves of the Jivaros, either by force or by debauching and degrading them. Neither of these methods succeeded and, ultimately, the Spaniards were forced to withdraw. Tradition has it that the present village of Sevilla de Oro (which will find a place in a later section of this narrative) was named as a memorial to the Sevilla de Oro which the Spaniards founded in the Oriente, but which was wiped out by the Jivaros.

The Jivaros are excellent gardeners. In fact, I have rarely seen cleaner or better stocked gardens among the so-called primitive peoples of the Americas. The basic food items are the sweet potato, yuca, and maize, furnishing both proteins and carbohydrates. Several types of sweet potatoes are raised. The yuca is the "sweet" type, that is, the selected form devoid of the bitter, poisonous principle in the form grown widely by the "down river" tribes, and which must be grated and washed in water before it can be used. A similar form of this plant is the source of our tapioca. Two quite distinct types of maize also are raised, one being primarily a parching type, the other sometimes ground into meal. The yuca, however, is the staple carbohydrate. Although the Jivaros are excellent potters and always have an ample supply of containers of all sorts on hand, they will not tolerate the soggy, pasty mess which the yuca root assumes when boiled, as it usually is throughout tropical Latin America; instead they steam it, whereupon it becomes a most excellent and tasty substitute for bread.

The yuca root, however, serves another equally important service in the diet of the Jivaros. From it they make *nijamàng*, their universal drink. The raw yuca root is first peeled, then chewed and spit into a large pottery vessel. It is interesting watching an expert at the job, for it is almost a continuous process. A large bite is taken from the root, chewed rapidly for a little while, the excess water from the root being rolled out of the mass with the tongue and expelled from one corner of the mouth, while the chewed mass, by now thoroughly mixed with saliva, is then ejected into the ready container. When about full, it is set aside. After some hours a little of the previous batch is mixed with the new and the container is again put aside for a few days to ferment. After proper fermentation, as much as is immediately needed is mixed with water and drunk.

The biological principles in the preparation of this combined food and drink are simple. The starch of the yuca root must first be converted to sugar, and the only enzymes easily available to them are those contained in their own saliva. The bit of a former batch already has in it the yeasts necessary to begin the conversion to alcohol. And the growing yeasts supply the much-needed vitamins in a diet otherwise low in these necessary items.

If I were to presume to offer a bit of advice, it would be this. The first time you visit a jivaria, you will be offered a large bowl of *nijamàng*. Don't sip it. Drink it without pausing for breath, then smack your lips volubly at the end and nod approvingly. Not to do so is to offend your host right in the beginning—and from there on you will be a social outcast and encounter indifference and obstruction. It is also a good idea to distend your stomach at the same time and pat it satisfiedly, otherwise you will be handed a second bowl. From there on, you will be on your own for, if properly matured, it can be insidiously heady stuff. Also, until one becomes an old hand with it, a too free indulgence produces about the same effect as an over-dose of epsom salts. Anyone with a queasy stomach had better stay out of the Jivaro country.

Their gardens also contain other food plants. A species of Marantaceae is quite often seen and one of the Cannas also is used. This latter serves a double function; its fleshy rhizomes may be eaten, but more often the leaves are used to cover food utensils or to wrap packets of food for a journey. The papaya also is commonly raised. I am fond of this tropical fruit and on various occasions tried to buy one. They would give me all the green ones I wanted, but they would neither give nor sell me a ripe one. They regularly stew the green papaya, but simply will not use them when ripe. Thinking that perhaps, for some reason, the variety raised by them was inedible when ripe, I surreptitiously took a ripe one and sampled it. It was by no means as delicious as those purposely selected for richness of flavor when ripe, but it was quite acceptable. I never got to the bottom of this taboo on ripe papayas, but there must be some reason for it, otherwise it would never have come into being. The plantain, or cooking banana, has been introduced, but has not made much headway. I join with the Jivaros in deciding that, properly prepared, their yuca is vastly superior in flavor to the plantain. Also yuca stores much better than the plantain, has much less waste, and is much easier to transport on long journeys; furthermore, yuca can be made into *nijamàng*, whereas the pulp of the plantain would rot and become a putrescent mess before the fermentation process could be accomplished.

Where barbasco is not naturally abundant, the Jivaros also propagate and raise this fabaceous plant. It is used as a fish poison. Pieces of the plant are beaten over the edges of their dug-out canoes (for usual river transport, they prefer the buoyant and easily constructed rafts). When sufficient material has been prepared, it is then mixed with water in the bottom of the canoe (usually by treading) and allowed to "steep" for a while. The canoe is then paddled to the upper part of a pool and tipped over. They then right the canoe and paddle to the outlet and select the fish they wish to keep as they come floating past. Obviously, fish of all sizes and ages are killed. They are well aware that a too-frequent poisoning of the fish seriously depletes the stock and so this is done only at relatively rare intervals. I was fortunate to see the process. Much of their actual fishing is done on the smaller streams where they have developed a most ingenious trap for use among the rapids. This trap operates by gravity. It actually strains the larger fish out of the stream, places them in the dry part of the trap, and so kills them without the need of anyone being in attendance; the small ones and fry are automatically dropped back into the stream to develop further.

Other plants are grown. One of these, a vine I suspect of being Apocynaceous although I did not find it in flower or fruit, is trained on special arbors only in the gardens of the head-men; it is used in some manner in certain of their ceremonies. Tobacco also was seen, but I could not make a guess as to its species since, at that season, the plants were not yet in flower. In certain gardens one also finds beautiful specimens of an arborescent *Datura*; these will be briefly dealt with in a later passage. A regular sight was a small plantation of the native perennial, arborescent cotton, raised by them since time immemorial for its long fibers. The Jivaros are excellent weavers, and have evolved a curious but effective loom. The cloth they produce is sturdy and fashioned with subdued but pleasing color patterns made from native dyes. And every garden has a stump covered with a species of *Manettia*; the specimen I brought back was presented to me by one of Patêhi's wives in return for having treated a jungle sore on one of her children. The plant bore masses of delicately tinted pink flowers. It is their remedy for dental caries; rather, I should say their preventive.

Many dentists think that it is a "sweetened" tooth rather than a dirty one which is prone to decay. The constant chewing of the yuca root leaves particles of its starch between the teeth, and these would be fermented to sugar by the salivary enzymes and so lead to dental caries. When I returned to the States, leaves of this specimen of *Manettia* were tested in the laboratories of the New York Botanical Garden for their "antibiotic" or bacteriostatic activity. The dried material was not found to be particularly active on the organisms tested. Dentists are not completely agreed on the exact cause of tooth decay and it may be that the leaves of this plant are effective in some manner not understood. All I know is that after chewing a batch of *nijamang* the Jivaro women regularly go to the garden, pluck a few leaves of this *Manettia*, and chew them. They also stoutly maintain that it is the only thing that keeps their teeth from decaying. The Jivaro matrons may become progressively more black-toothed as they grow old, but they do not become snaggle-toothed hags in their late twenties, as do the women of the upland, Andean tribes.

Jivaro marriage customs are interesting. The *tarimiat*, or first wife, usually is bargained for between the parents when the future husband is in his 'teens. Thereupon he goes to live with his future in-laws. If, at the end of the first year of the betrothal, the girl is not pregnant, the wedding is called off and he goes back home. If, however, she is with child, the actual "wedding" ceremony is still some time off, for he has not yet proved himself capable of taking his full place in the community. First there is a *jea* or house to be built. This is no simple, three-sided jungle shelter. It is a large place, with a series of separate interior apartments, for himself, his first wife, the anticipated wives to follow, and their broods of children. Arrangements also must be made for the cooking place for the whole household, a general space and benches for conversation when visitors come, and places where they may sleep when staying overnight. This all is under one roof. The timbering must be well engineered for so large a structure, and the palm leaves for the great expanse of roof thatch individually and carefully smoked over a special fire so that they will resist rot.

The prospective bridegroom now has his *tarimiat* and his *jea* but, according to tribal custom, he still cannot rightly claim his place in the social structure, and he may not occupy his house. He first must prove his prowess in combat and appear with a *tzantza* of his own. Since childhood he has been practicing the art of making shrunken heads—and it is an art—by using those of monkeys caught in the chase, and so this is no new thing. But this may be his first human one. Also, one doesn't just wait along the trail and plunge a spear through the first unwary passerby. It has to be obtained some distance away and in enemy territory, either as part of a regular war expedition or as a lone-wolf affair. Having taken his head and made his *tzantza*, he may then return, enter his house by the front door with full ceremonies, and take his place in the community as the head of a household or jivaria. From there on, additional wives may be acquired either by barter or theft.

The details of the making of the *tzantza* might be of some interest. Also, one could record the complex social customs of these interesting people. But these are outside the bounds of a brief note on the collecting of plants in this remote region. One might add, however, that some of those who have written what seem to be authoritative works on these subjects clearly indicate that they have never lived with the Jivaros even for a brief time and so have no real understanding of the situation. For example, three wives are a minimum number for a well-ordered household. There must be expeditions away from home for hunting and fishing to augment the proteins in the diet. One wife must stay at home to tend the garden and take care of the accumulation of youngsters. The other two go along to assist with the work. Usually they are nursing and must carry their infants with them. Whether the quarry be fish or monkeys, it is cut up and dried over a fire and smoked to further preserve the meat. Therefore one wife must remain in camp during the day to tend to these chores; the other wife goes along to assist with the fish traps or acts as a second pair of eyes, a great help—almost a necessity—in jungle hunting. The wife in camp also tends and nurses the child of the one out on the chase. The next day the wives exchange their duties. It is a system of complete cooperation in the round of family duties but, for its proper function, requires an imbalance of the human sex ratio, a 3:1 ratio rather than the usual 1:1 ratio. Those professional "do-gooders" who beat their breasts and deplore the taking of human heads by these people, do not understand the nature of the life required of them by their environment or the structure of the family. The elimination of two out of every three males in the adult population is the only way in which the social structure can be maintained or the family kept as a functioning unit. The making of the *tzantza* is only a bit of symbolic ritual, closely akin to the ceremony of Communion as practiced by Christians—the taking of human flesh and blood as symbolized by the sanctified bread and wine, a ritual derived from the ancient and sacrificially bloody helioatric religions of the Mediterranean region.

THE WESTERN ESCARPMENT

Early in April, 1945, I was called to the Quito office to close up the work of the explorers of the *Misiōn de Cinchona*. The others already had left, some of them several months previously. There was a last hurried errand along the Río Pastaza into the Oriente east of Baños. And then on April 18 the work was officially ended. The next day I set out on the return trip to Cuenca, which was to be headquarters for the remainder of my sojourn in Ecuador.

My old crew of Jorgensen, Prieto and Giler reassembled the last days of April. I had rented the residence which had housed the *bodegas* of the old *Misiōn de Cinchona* in Cuenca. This was admirably suited to our needs, for it gave us ample room, both for the storage of specimens as they accumulated and as a residence for the crew when in town. At last the collecting could follow a predetermined pattern and not be a casual adjunct to the necessarily primary activity of search for *Cinchona*. As a result it was determined that our first major objective would be to attempt a transect of the western escarpment.

Arrangements had been made previously with Dr. Herbert Spencer Dickey to occupy part of his establishment in the village of Huigra in the Cañon of the Río Chanchan. We arrived at Huigra the evening of May 5 and the next day set up our equipment in the then unused hospital which Dr. Dickey once operated. Adventurer, explorer, bon vivant, raconteur extraordinary, and tropical doctor, Dr. Dickey, until his retirement, had been chief medical officer of the Quito-Guayaquil railroad. His recent passing leaves a void among those choice personalities which one sometimes encounters in out of the way places.

Active collecting in this general area extended from May 7 to June 19. During this time, our activities took us out onto the coastal plain in the region of Naranjito (Prov. Guayas) at an elevation of about 120 ft. Here Prieto became quite ill, for this was the first time in his life he had experienced real tropical heat although he had never been more than a few degrees in latitude from the equator. He was put on the train and sent back up to Huigra where I was certain he would recover.

After a few days in the region around Naranjito, we moved back toward the mountains, to the town of Bucay. This area is at about 1000 ft. elevation and still quite uncomfortable to one who has spent the previous year at much higher elevations among the Andean peaks. Jorgensen fell ill soon after we arrived in Bucay and was sent home to Guayaquil, where he could get adequate medical attention. At this juncture it was ascertained by telegram that Prieto was recovering rapidly and able to operate the driers. Therefore we sent the bulk of the equipment to him, at the same time making arrangements for the bundles of undried collections to be put on the train early each morning and unloaded in Huigra, where Prieto would be waiting for them. This left Giler and me completely free to devote all our energies to collecting. They were small enough, since both of us were having attacks of fever, which did not make the work easier. We stuck it out for five days of collecting in the region around Bucay and then, finding that the law of diminishing returns had begun to catch up with us, returned to Huigra.

Prieto had been almost swamped with specimens, and so, while we all got needed rests, we cleaned up the last of the accumulation and those "stubborn" semi-succulents which always give difficulty in drying. Jorgensen returned but, like the others, was not in good shape. There still was a stretch between the 2,000 and 3,000 ft. elevations which we had not touched. Of the three, Prieto was then in best shape and so on June 19 he and I set out before dawn, feeling our way across the ties between the rails. We arrived at the 3,000 ft. level just as the sun came up, and from then on it was a mad scramble up the walls of the cañon and into the lateral valleys for certain choice things which we had not collected before. That evening, just as the brief twilight slipped into darkness we passed the 2,000 ft. elevation, and later stumbled into the tiny village of Naranjapata. There we bought full-fare railway tickets and, as is the custom and sometimes a necessity in Ecuador, hopped the first freight, strapped our heavy packs of specimens and ourselves to the narrow runway on the top of a freight car, and enjoyed the smoke and cinders during the wild, careening ride back to Huigra. With this, we had begun to make real headway in our transect.

The crew was willing but in no shape to plunge into another round of heavy work, so I decided to return to headquarters for further rest and recuperation, and also to sort and pack the specimens in napthalene. Some incidental collecting also was done in the vicinity of Cuenca during that period. We returned to our project of the western escarpment on July 4. Contact was made with the highest vegetation zone worked in the previous period, and from there we collected onto the páramo.

Perhaps as a matter of some interest, the material of this botanical transect of the western Andean escarpment was collected between elevations of 120 ft. and 11,500 ft. It consisted of an excess of 1,000 numbers of which, where possible, a full set of duplicates were taken—usually six or more depending on the nature of the material. Although by no means complete, these 1000-odd numbers should give a fair sampling of the flora of the region at that time of year.

We were now deep in July and I had wanted to see what the "winter" flora might be like on the Páramo des Soldados, west of Cuenca. Bad weather had postponed the trip several times. Finally we set out but were turned back from our objective by a snowstorm. Rather than call the day a total loss, we tried a small valley near the edge of the páramo. July 16, spent in the region of the tiny glacial lake in the head of the valley of the Surucucho, is a memorable one for, as we left the valley that night, our pack animals were laden with more than 550 specimens. This single day of collecting has been chronicled elsewhere (Jour. N. Y. Bot. Gard. 47:25-31. 1946) and need not be detailed here.

An opening with permanent employment and chances of advancement came to Jorgensen. He offered to stay with me for the remainder of my work, even on the chance of losing the position, but I felt he should accept immediately. Although we had a little farewell party it was not a very hilarious affair.

THE CORDILLERA ORIENTAL

With time running out on me a decision was necessary. There were so many places which might be collected that it almost was a temptation to make a sort of grand tour, skimming a few trophies as we went along. There was even a temptation to go into the region of Chimborazo and collect around this great snow encased volcanic cone. It was decided otherwise. Almost every previous plant explorer had ascended this mountain and so I determined to turn elsewhere. Being more accessible, both the western and central cordilleras had been earlier explored by others. The eastern cordillera is botanically but little known except in a relatively few areas—and these from rather scant materials. Furthermore, in my work with the *Misión de Cinchona*, I had long noted the botanical richness of the *sotobosque*—that zone between the high forest of the humid regions and the treeless páramo. On the eastern cordillera the sotobosque often assumes the character of a true, high altitude "mossy forest." As it breaks onto the páramo, the sotobosque often becomes dwarfed and there is replete with shrubby forms and herbaceous materials. Under the best of weather conditions this is a zone of almost constant fog and we were now getting into the worst of the rainy season for that part of Ecuador. Trails onto and crossing the páramos of the eastern cordillera are relatively scarce. We therefore decided to try and find a place somewhere near the little village of Sevilla de Oro to set up temporary headquarters for our work in that region.

A place was found in the mud-walled house of Señora Nieves-Cordova, espoused to one Jesus Villavicencio. The house was located approximately 3 kilometers north of Sevilla de Oro at an elevation of about 8,000 ft. It was the highest habitation in this fog-drenched region and admirably suited to our purpose, for preliminary work on a projected road to Mendez had opened a means of access from Sevilla de Oro along the shoulder of the valley of the Río Collay toward the Río Paute, above the cultivated and pastured zones. From this, we could penetrate the last of the high forest and soon reach the sotobosque zone; on occasion, we found obscure trails which led to the páramo, there somewhat above 11,000 ft. Both the old and new trails from Sevilla de Oro across the Páramo del Castillo also were available for trips to the higher elevations.

Active collecting was begun in this area on July 27 and continued through September 4. As I have said, it was the height of the rainy season, and there were days on end when we never saw the sun; rarely did we return at night without having been drenched at least once. In general, however, the rains did not come early in the morning; usually we already were so far along the trail that there was little use in turning back, and so collecting continued for the day.

I was frankly surprised at the number of plants in full flower during this seemingly inauspicious season. The bulk of them were entomophilous and I almost wondered whether the insects that pollinated them might be aquatic. It soon became evident that many of the Andean insects of this region were a special type that did not wait for sunny weather to go about their chores, but would emerge from their hiding places as soon as the rain slacked, and worked apparently with full vigor in heavy fog. On those brief periods when the sun did shine, the air was alive with the hum of the more timid sorts as they seemingly attempted to make up for lost time.

Mention of flower pollinators leads inevitably to the hummingbirds. The Andean hummingbirds never ceased to amaze me. I had read of them, but one has to see them to appreciate their great variety. In size they run anywhere from something no bigger than the last joint of one's thumb to as large as blackbirds; they have borrowed almost every color in the spectrum's range and magnified them with brilliant hues. But it is not their size or color that astonishes, it is their probing bills. Some turn down and some turn up, and some point straight ahead, some of these with bills so long that, in flight, they seem like jet-powered bodkins. Each has evolved a certain form of nectar-probing bill that enables it to work on a special type of flower, and to which it is limited. One day I saw one flying along which seemed incredible. Even for an Andean hummingbird it was fair-sized; shortly after leaving the head the bill turned upward at almost a 90° angle. It flew to a clump of Crimson Angel's Trumpets scarcely more than ten feet from where I stood, hovered beneath an open flower, and then slowly raised itself on its rapidly beating wings until the bill reached the nectar deposits of the flower. When I say that the narrow corollas of *Datura sanguinea* are about 10 inches long and that the nectar is located at the base of the flower (the flowers hang down), one may gain some idea of the astonishing, periscope-like nectar gathering apparatus of this bird.

And mention of this plant also leads to a brief note on the group. *Datura sanguinea* is supposed to be a native of Peru. It is widely cultivated as a roadside "living fence" in parts of the northern provinces of Ecuador; I never found it thus in the southern provinces. I did find it in the southern provinces, but only about old temple platforms or ancient ruins. The Jivaros of the eastern lowlands regularly raise other kinds of this genus, these being perhaps somewhere in the general affinity of the *D. arborea* group, but usually in soft pinks and salmony pastel shades. As individual plants in the gardens of these head-hunters, they make a striking show, and far outrank in beauty any hybrid Daturas I have yet seen in cultivation. It was with deep regret that I could find no seed on certain of these plants (they may be self-sterile); and it was impractical to attempt to make cuttings at that time. The seeds of the group are supposed to contain a potent narcotic. However, it is the leaves that were and still are used.

Jorgensen told me how, while he was panning for gold in the Oriente some years previously, an accidental gunshot lodged in the muscles of his leg. No doctor was available, yet it was necessary to remove the bullet if he were to recover properly. The Jivaros took charge of him, made a decoction of the leaves of the species which they raise for this purpose, and had him drink it. He soon became drowsy. When he awoke (they told him that it was about 36 hours later) the bullet had been removed and the deep cut skillfully poulticed with native medicaments. Unfortunately, he could not see. He complained of this, but was told to be patient. He said that he did not regain normal vision for another four or five days, after which there was no apparent further effect of the narcotic.

One of the common sights in archaeological museums is the ancient skulls of former inhabitants of the Andes, often with holes where they had been quite skillfully trepanned, probably for the relief of abscesses of the brain or similar cerebral afflictions. Many give evidence of post-operational healing, indicating that the patients survived and lived for quite some time afterwards. In speculating on these items some have wondered how they held the patient still for so tedious and painful an operation. I think we need hunt no farther than the genus *Datura* for the anaesthetic which these ancient surgeons used. The common occurrence of these trepanned skulls, especially in the older archaeological sites, has puzzled many workers. They might be reminded that syphilis is endemic to the Andean highlands and that the inhabitants have been afflicted with it so long that they have evolved a race now apparently almost immune to its secondary and worst effects. In my year and a half in the back country of Ecuador I never saw a case of what I would suspect was syphilitic paresis among the true natives. With the indigenous inhabitants such an infection is scarcely more troublesome than is the common cold with us. Their favorite "cure" is a decoction of the native *Ephedra*. But I wander from the field of plant exploration into ethno- and medical botany; I trust, however, that someday my fairly extensive notes on the native pharmaceutical plants, as employed by the Quechua-speaking peoples of the region, will be collated with the plant identifications yet to come and so made available to workers in this specialized field.

THE COLLECTING

In the year and a half of field work in Ecuador, something over 5,200 separate numbers were collected; with the duplicates, materials for approximately 26,000 individual herbarium sheets were prepared. To these also should be added certain small collections of my three major assistants, taken when they were on special assignments. In general, however, their specimens, although credited to them on the tickets, were run into my own number series and so appear in the general tally. As intimated in earlier passages, during the first year, while employed in the search for *Cinchona*, the collecting was desultory, or connected in some way with that exploratory work. Also, during that time when naught but oddments could be snatched along the trails, or where an occasional day only could be devoted to straight botanical work, the duplicates were not so ample as one might wish. The last six months saw a much better organized system of collecting and handling the material; this resulted in our ability to produce much larger numbers of specimens.

I have been asked on occasion for details of the methods we used and so, for the sake of those who may be projecting a fairly substantial collecting expedition, these may be outlined. In the first place, it is useless to think of collecting either efficiently or on anything like a satisfactory scale in the rainy tropics unless one dries the specimens with artificial heat. This is a prime requisite. I have discussed this item at greater length elsewhere and need not repeat the arguments in favor of the system (see: "On the Use of Artificial Heat in the Preparation of Herbarium Specimens," Bull. Torrey Club 73:235-243. 1946). I would, in fact, extend the method there outlined to any part of the world, and to any type of plant material, if there is need to handle any but the smallest amounts of material, and if one has a sincere wish to turn out quality specimens.

So far as the actual collecting is concerned, I would not be caught with a vasculum as used in the usual manner. They are an utter abomination and have resulted in more poor specimens than one wishes to contemplate. If one must use a container, then use a waterproof bag of some sort. But in doing so, take special care that the material of each number is wrapped separately (usually in a piece of newspaper) and so placed that odd flowers and other parts will not fall out and become mixed with other specimens. The argument that one saves time by jamming a lot of loose specimens into a vasculum, to be sorted that night, is fallacious. Such statements are made by those who have never done any time-studies on the necessary operations to produce a dried and finished specimen. In actual practice, my usual method is to collect directly into the newspapers, using only an occasional blotter between every three or four numbers, if they have ample duplicates. The actual field procedure is as follows.

The field presses are loaded with the amount of newspapers one soon learns will be necessary for the day's work, plus a little extra for emergency collecting. These presses should have special straps so that they may be used as packs, or special slings can be fashioned according to the carrying customs of the assistants available. (The tump-line over the head is favored by most indigenous carriers, but I personally prefer a combination of both tump-line and shoulder webs.) Arriving at the scene of the first collecting station, the presses are shed, along with other equipment not then immediately needed. Sometimes one assistant would be assigned to a particular task, the climbing or felling of a tree, or to the collecting of a particular series of plants. More often, as our group became experienced, we would split up and individually go in different directions, each agreeing to stick rather well to a certain type of habitat. It also would be agreed that we would return to the presses at a certain time, usually at the end of a half hour or so. Each man carried a machete, and the first man back would enlarge the clearing a little if it was not sufficient in the first place. He then would lay his specimens out in small piles, carefully separating the individual collections. Soon we all would be back and the actual process of putting them away would commence.

Each man would stand beside his piles of specimens and I would have my small field book ready with the first number. The number would be placed prominently on a sheet of newspaper and the assistant quizzed about the details of the plant—its type, habitat, or any other item not visible on the specimens. Then, with the fresh material before me I would add other pertinent notes, such as color of the flowers, etc., etc. The newspaper with its number outside then was placed on the ground. For woody materials, I always carry a pruning shears in a special holster. This is then brought into play and as many specimens cut from the material as needed and placed on this individual sheet; extra flowers or fruit, if desirable, are then stripped from the remainder of the collection, and the residue tossed out of the way. We would then go on to the next collection and repeat the note-taking process and the trimming of sheet-size specimens.

In the meantime another assistant would follow behind with a bundle of newspapers and start at the first pile of specimens, already trimmed and ready for the papers. These would then be placed individually in their papers, using enough to clean up the pile, any odd flowers or fruit being scattered through the collection or sometimes given a separate sheet of their own. The paper first placed on the ground, and which bore the number of the collection, was then folded around the whole set, so that the open margins of the other sheets would be closed. This packet would then be laid lightly in the press, or held down merely by the weight of a small stone or some other object, in case there was any breeze stirring. Arriving at the end of the first assistant's collections, the one then putting the material in press would come over and we would start out on his collections, the first man working on the specimens where the other had left off. My own collections would be similarly cared for. In this way, in a remarkably short time, we had converted the lots from raw material into specimens, *already cut to herbarium sheet size*, and filed them in their newspapers; the field notes also had been completed. The individual packets of collections were then placed in press in serial order, as they had been numbered, with an occasional blotter interspersed when the packets became a little too thick; the blotters are not necessary, but serve to keep the contents of the field presses on an "even keel" when opened at the next stop. Soon we would be on our way and ready for the next collecting station, where the process would be repeated.

In this manner there was no packing of a lot of excess waste material back to camp, "to be cleaned up when one has more time that night." In a well run plant explorer's base camp, there isn't any extra time at night for this kind of messy fumbling. Also, it is worse than foolish to trust to one's memory about the details of the plants of the day and jot the notes down that night. There have been more errors perpetrated by this sloppy method of assembling field notes than many are willing to admit. The field notes should be taken in the field, and not jotted down hours later (or sometimes hastily the next morning) after one's memory has become hazy about certain details of height, habit, and habitat.

Our drying stoves also were our cooking stoves. Therefore, immediately after supper, the residuum of the material on the fire the night before would be sorted and any completely finished pulled out of the presses. In the meantime, the material which had been in press for a day, but not on the fire, was being sorted and the plant materials carefully arranged on the sheets. (In the paper on artificial heat, I stressed the desirability of "seasoning" the specimens for a 24 hour period in blotters before putting them on the heat; this accounts for the supply of plants to go on the fire being at hand soon after supper.) These "seasoned" specimens, now carefully arranged, would then be placed on the fire. Then the collections of the day would be tackled.

By that time, those which had been collected earlier in the day would have been somewhat "tamed" and ready for their preliminary arrangement on the sheets. However, there was an additional chore. Before any arrangement was done, *each sheet* would be numbered with the number on the covering slip-sheet. This is one operation I discovered should better be done in camp at night. The reason is rather simple. We often collected in the rain. As a result, the sheets sometimes were soggy. Paper was too scarce in Ecuador to be thrown away and so these soggy sheets were laid aside to be used again and dry ones substituted. Had they all been given a number in the field there is a possibility that the number might not have been crossed off when the paper was used the second time, and so cause confusion of numbers at some later date. If the sheets were only damp as taken out of the field presses, they were used that way. After considerable experimentation I have found that a special but not expensive item known as a "surgeon's skin-marking pencil" is the best. A soft and waxy pencil is desirable, but it should not be friable or gummy; the skin-marking pencil has the proper texture and also will work on fairly wet paper, making a heavy mark without tearing.

In putting the plants of the day's collecting into press, it is not necessary to have completely dry blotters. In fact, it is my opinion that with many materials, slightly damp blotters are best for the first 24 hours. The main purpose of this "seasoning" period, as I see it, is to permit the plants to carry on a little anaerobic respiration—as they will in a tight and slightly dampish press. This results in the conversion of a portion of the carbohydrates to fatty compounds and these, in turn, seem to distill throughout the plants while on the heat at a later period and so keep the specimens a bit more pliable. As they become too damp, the blotters may be fed into the driers with the specimens.

By using these systematic methods of collecting and attending to the specimens, three of us—Prieto, Giler and I—turned out some 6,600 specimen sheets in about 40 days while in the eastern Cordillera. Part of the time Prieto was on a wild-goose chase across the range in the Oriente trying to track down the flowers of several species of *Cinchona* I wanted but which we had missed the previous year, Giler was sent back to Cuenca on various occasions with accumulated materials and to replenish our supplies, population-sampling at different altitudes in several groups occupied various days, and we soon cleaned up the area near headquarters and so often had to climb miles at altitudes near or above 10,000 ft. to get to really productive new areas. And all of this was done during the height of the rainy season under the worst possible climatic conditions for field collecting, and at a season when the flowering material was at its low ebb. I have recounted the foregoing not in a spirit of boasting, but to indicate the reasons why I am a firm believer in systematizing the collecting routines and also why I am a strong advocate of drying by artificial heat and the use of metal corrugates. With all of this we also found ample time to visit back and forth with our new Cholo friends, and make merry when the occasion arose. It was not a dull time with all work and no play; it was a full and satisfying experience. In the meantime, although we did not then know of it, a bomb had dropped on Hiroshima.

ACKNOWLEDGEMENTS

One cannot properly acknowledge the help rendered in so many ways by so many people in work spreading over so long a time and under such varying conditions. The officials of the *Misión de Cinchona* in Quito were most encouraging. I have already mentioned the work of my three main assistants. One also remembers those times when mule's would flounder in the mud of the trails, and when the muledrivers would have to jump into mud to their belts and hold up the heads of the mules to keep them from smothering, while others jumped in and quickly cut the pack ropes to rescue cargo boxes of precious specimens, even before they extricated the mules; the mud does get deep on Ecuadorean trails. And the

thousand little courtesies extended to a stranger as one would go about one's daily tasks. None of these can be properly acknowledged here.

I would also wish to thank the Director of the New York Botanical Garden for having obtained a grant of $2,500 for the work of the last six months. It was an opportunity which I felt should not be wasted, since I knew something of the country and had available a crew of excellent assistants already trained in the details of plant collecting. But to maintain this crew, even at very modest salaries, and to take care of our daily living expenses and travel, it was necessary to add to this sum an equal amount from my own funds. I have never regretted this personal investment toward a better understanding of the complex flora of this part of the American tropics and also to fill out my botanical education.

Also, I would wish to thank my former colleagues of the New York Botanical Garden who undertook the care of the collections when I left that institution, and especially Mr. John Wurdack, onto whose shoulders fell the usually thankless and always tedious task of sorting the bulk of the collections and of seeing to the typing of the labels, chores which were only partly done when I left.

Lastly, it is my great pleasure to thank those various specialists in plant taxonomy who have studied and still are working over various groups of this material. I naturally await their determinations with considerable interest. Some of the specimens doubtless will be from widespread Andean "weeds"; I often knew them to be so, but even "weeds" are often of ethno-botanical importance. Others of the specimens are certain to be from little-known kinds, and so increase our knowledge of them. And a few, perhaps, may prove to be those cherished jewels of all taxonomists—the so-called "new species." And here it should be admitted that, as a person primarily interested in the genetic structure of plant populations, I was not above slipping into the collections of groups other than those of particular interest to me certain series of "intergrades" between what I supposed might otherwise appear to be rather sharply defined species. This was not done to further perplex my taxonomic confreres, but as a possible aid in furthering an understanding of the complexity of our tropical floras. I trust that, in general, my field notes will serve to indicate the nature of such collections.

Several technical papers in part based on materials collected during the course of this work already have appeared. They are as follows:

Camp, W. H., *Cinchona* at High Elevations in Ecuador. Brittonia 6:394-430. 1949.

Steere, William Campbell, A Report of Some Recent Collections of Rubiaceae from Ecuador. Bull. Torrey Club 72:295-311. 1945.

COLLECTION NUMBERS

On leaving for Ecuador, there was no idea that any sort of extensive collecting was to be carried out; certainly the work of the last six months was not envisioned. The records of my previous collections had been stored in New York and the boxes moved out of my former office. It therefore was impossible to ascertain the last number in my regular collection series and I had forgotten it in the many activities of the early war years. Therefore it was necessary to start a new series; however to avoid duplications, these were prefixed with an "E" (indicating Ecuador) to distinguish them from the same number of my earlier collections.

Certain of the collections made during the work of the *Misión de Cinchona* have somewhat complicated code letters. This was advisable because of the need for correlating the analyses of *Cinchona* barks with a series of field collections of herbarium materials through the medium of chemist's reports. To avoid clerical errors in the Quito office, a special system of numbering was developed for the various small exploring parties under my direction.

It was almost certain that errors would creep into so large a series and also that seeming inconsistencies would develop. A few may be noted which already have come to light and are here appended.

643. "Valley near Portovelo." This is the valley of the Río Amarillo.
700-752; 1620-1644. "Chaparral and páramo E. of El Pan." This is the Páramo del Castillo of later collections.
1392. Apparently there are two collections with this number.
1682-1710. This material, collected in May, 1944, in the Oriente in the region of the Río Pastaza while in company with Dr. W. C. Steere, was not then given serial numbers. It is therefore chronologically out of place in the series.
2296-2348. In an unfortunate transcription, these numbers were dated April 26; they were collected March 26.

NOTES ON OBSCURE LOCALITIES

In general it was my aim to locate the collections while in the field so that anyone wishing to find them on a map (or perhaps revisit the area) might do so with ease. To this end the American Geographical Society made me a special folding field map, assembled from various sheets of their usually excellent map of Hispanic America, 1 : 1,000,000 scale, the Provisional Edition, then current. This was my constant field companion for a year and a half and is beside me as I write these notes. This provisional edition doubtless soon will be revised. However, its scale was such that, on occasion, it was necessary to use local maps with more detail. Lacking these, as in our work in the Oriente, it was requested by the office of the Misión de Cinchona that we prepare such reconnaissance maps as would be needed for possible future work. These were necessarily sketchy, since we had no proper instruments for traverse work. However, the map of this report, split through the center, has been taken from a larger map prepared and delivered to the Quito office on January 1, 1945. It is, so far as I am aware, the most detailed chart of this part of the Oriente yet published. The major parts of this map were put together from the notes and field sketches compiled by Mr. Jorgensen and myself with, of course, such local information as we deemed reliable. Adequate indications of latitude and longitude have been omitted; key points will serve to orient any user of these charts when correlated with a standard map.

The permanent labels for the specimens were printed on my return from Ecuador. Where the numbers of specimens warranted, the localities were printed directly on the labels, leaving only the field data of each collection to be added. In doing this every attempt was made to include such information as would serve to locate some of the more obscure places not appearing on the American Geographical Society's maps, by reference to some well known and easily located place. This was not always possible. Therefore for the sake of those desiring as nearly exact localities as possible for mapping purposes, a list of those which I deemed might give most trouble has been compiled. Where the Society's map is referred to in the list, it is abbreviated as "the 1/m map."

In the Oriente, transliteration of Jivaro place names gave considerable trouble. I am not a student of linguistics, and it was only after the printing of the labels that I had opportunity to examine in any detail the work of P. Juan Ghinassi—

"Gramática teórico-práctica y vocabulario de la lengua Jibara" (Quito, 1938). This will explain the need for extended notes on certain place-names locating our collections in the Oriente. Jivaro is not a simple, "primitive" language; it has a highly complex grammar and is replete with fine nuances of meaning depending on inflection and the differences in word endings.

The altitudes and distances are sometimes given in metric and at other times in English units. Where Ecuadorean maps or the Society's 1/m map were used as a basis of reference, the distances and altitudes are in the metric system. Where distances were taken along roads during travel by Jeep, the speedometer readings in miles were used. Of the various altimeters available to me, not one was calibrated in meters; therefore to avoid errors incident to conversion, the altitudes in feet were recorded in the field and carried through the notes and onto the labels. For some reason, passing storms in the equatorial Andes do not produce the marked effect on barometric pressures which one expects; this was noted as early as the time of La Condamine, in Andean Ecuador ca. 1735-1743. Therefore, if properly calibrated at some known point of reference from time to time, field aneroids are amply accurate for the purposes of plant collecting in this region.

The alphabetized list of obscure place names, or those which need amplification or correction follows.

Alpachaca, Cordillera de—The Allpacha Silvan of the 1/m map. The Pan American Highway (q.v.) heads roughly S-SW from Cumbe, follows the length of the Cord. de Alpachaca, and crosses the Río León just north of Oña, thereby missing the towns of Nabon and Cochapata.

Ambocas, Río—Apparently misspelled as "Río Ambarcas" on 1/m map.

Baños—Two places of this name appear on the labels, one in Prov. Tungurahua along the Río Pastaza, the other in Prov. Azuay SW of Cuenca.

Bucay—A town of considerable size on the Quito-Guayaquil railroad at the foot of the western escarpment of the Cordillera Occidental. It has replaced Huigra as the important place where the trains from Guayaquil are broken up and a few cars each are double-headed up the Cañon of the Río Chanchan to Sibambe and over the "Devil's Nose" switchbacks to the uplands, where they are remade into regular size. Trails in the area follow no regular pattern; as a result we never knew just which province we were in since Bucay is located almost at the junction of Guayas, Bolivar, Chimborazo, and Cañar. In any event, for Nos. 3640-3851, all were taken within a day's walk of Bucay.

Cajanuma, Nudo de—"Cross range" about 7 km. S of Loja, easily located on 1/m map by "Paso Cajanuma."

Canillones, Tambo—Shelter house on new trail between Loja and Zamora, on Oriente side of range.

Castillo, Páramo del—The páramo on the crest of the Cord. Oriental on either side of the trail from El Pan to Mendez (Map 1). The Oriente side of the páramo is marked by the starkly uplifted, almost spire-like dark rock which, castle-shaped, gives the páramo its name; this rocky peak also is known as Cerro Negro.

Carboncillo, Páramo de—On the Loja-Azuay border between Saraguro and Oña. The 1/m map has the province boundary running up the valley of the Río de Oña; a semi-official Ecuadorean map has it to the SW, following the divide between this river and the Río Paquishapa.

Cerro Negro, Tambo—Just below páramo del Castillo, Oriente side of range on trail from Sevilla de Oro to Mendez; Map 1.

Chasqui, Páramo de—Near the village of Chasqui, Prov. León.

Chiguango, Río—The headwaters of the Río Yaguachi; the Río Chiguango has its primary source in the Paso de Mataperros.

Chontal, Hda. (Hacienda)—Valley of the Río Negro; Map 1.

Chontal, Tambo—Above confluence of Río La Paz with Río Negro (same locality as Hacienda Chontal). Map 1.

Chupiantza—Jorgensen Nos. OHJ 4 & 5; refers to uplands south of Mendez (see next).

Chupiantza, Río—There is considerable confusion over the application and spelling of this name. The 1/m map has the Chupianza (a variant spelling) just south of and confluent with the Río Paute, being the lower reaches of the Río Negro; I have used this in Nos. 1540-1570 as a locality and in conjunction with the Río Negro, so there should be no confusion. The Río Chupiantza of most labels is confluent with the Upano north of Mendez. To add to the confusion, the name Chupiangas, apparently interchangeable with Chupiantza and Chupianza, is likely to occur on future maps, but whether for the stream north of Mendez or as the lower reaches of the Río Negro will depend on the whim of the cartographer involved. See Map 2 (also see above).

Chupianza—See above.

Chupiasa, Río—Perhaps an error in my transliteration, since Ghinassi lists a Río Chiviaza for the region. One night in camp the Jivaros (at my instigation) had an argument about place and river names for the region. As nearly as I could gather, they agreed (with some dissenting voices) that this river was the Chupiasa rather than the Chiviaza; and so it was listed in my field book and on the labels. However, on the map I have bowed to Ghinassi, and used his transliteration as probably being more correct (Map 2).

Consuelo, Tambo—Between Río La Paz and Río Pailas; Map 1.

Cruzado, Cerro el—Trail between Indanza and Gualacéo; Map 1.

Cumbe, Río—Rises on páramo beyond Cumbe and is confluent with the Río Tarqui near the village of Tarqui. This area is enshrined in the history of Ecuador as being the deciding field of battle in the country's fight for independence.

Cutucú, Cordillera—Map 2. A range just east of the Río Upano and about 80 km. east of the crest of the Cordillera Oriental, and a northward extension of the Cord. del Cóndor. Its uplift was more recent than that of the Cord. Oriental, the most recently elevated of the main Andean ranges.

Etzentza—See Itzintza.

FF. CC.—Spanish abbreviation for Railroad.

Gloria, La—Valley slope S of Río Pastaza opposite El Topo (q.v.). At time of collections this was a tree nursery operated by the Misión de Cinchona.

Guagrauma, Nudo de—Cross range about 12 km. S of Saraguro and 55 km. N of Loja. Paso Ramos-urcu and Paso Atacana of 1/m map are in this range.

Guyaba, Río—Branch of the Río Catamayo, entering it near La Toma; spelled Guyabal on 1/m map.

Huatracaja—Uplands NE of Azogues; Map 1. This is the region of the Cerro Yausán (elev. 3632 m.) of the 1/m map. On several occasions while alone attempts were made to get to the top without cutting trail but I was stopped each time by a particularly heavy sotobosque developed near the 11,000 ft. elev.

Indanza—On trail S-SW from Mendez; see Map 1 and 1/m map.

Itzintza—This should have been transliterated as Etzentza (Map 2). I listened with special care to the pronunciation of the name, for it was the locale of our base-camp in the central Cutucú, and to me it definitely had more of an "i" than "e" sound; however, I bow to Ghinassi's transliteration. Patéhi explained that it was named so because it was the river where they got a certain kind of ornamental bead which they used (from *Etza*—the name of the bead, being the seed of a vine which I did not see in flower or fruit but probably one of the Fabaceae, and *Enza*—meaning "water" or, by extension, "stream" or "river").

Kumza, Río—Confluent with the Río Yunganza; Map 1.

León, Río—Río Leonhuaico of 1/m map, NW of Oña.

Loma de Oro—Hill above 10,000 ft. elev. in the Nudo de Guagrauma (q.v.).

Malacatos—About 27 km. S of Loja; on some maps listed as Valledolid. Not to be confused with the Valledolid of 1/m map further south across the Nudo de Sabanilla in the Oriente.

Mataperro—The region around the Paso de Mataperros.

Mataperros, Paso de—Cord. del Cisne, W-NW of Loja.

Mirador—A locality on Cerro Partidero (q.v.) on main trail to Mendez.

Moro-moro—About 10 km. west of Piñas, which is west of Zaruma on 1/m map.

Naranjapata—A small village in the cañon of the Río Chanchan about midway between Huigra and Bucay (q.v.).

Nariño, Dept., Colombia—While working on the uplands in Prov. Carchi, Ecuador, we inadvertently crossed the unmarked boundary and found ourselves in Colombia, near the village of Chiles. A few numbers were therefore actually taken in Colombia.

Negro, Río—Map 1. In Jorgensen No. OHJ 6 this refers to the lower Río Negro (or Chupiantza) SW of Mendez.

Nudo—Literally a "knot" and applied to E-W "cross ranges" connecting the main, generally N-S Andean ranges; alphabetized under place name rather than "Nudo."

Ontza, Río—Central Cutucú. Should read Río Tzantza (Map 2). This is an error which occurs on labels for Nos. 1177-1197. The Jivaro with me at the time and who was naming the plants (and streams) as we passed was unusually soft-voiced and used a broad "a," stressing the first vowel; I did not catch the low, sibilant "tz." The original field book error was inadvertently copied when the labels were printed.

Pailas—See Pilas.

Pan American Highway—As used, this refers to the segment between Cuenca and Loja. The kilometers are numbered from Cuenca. Km. 20 is where the Cuenca-Giron road branches from Highway; Cumbe, km. 28; Páramo de Tinajillas, km. 45; Río León, km. 97; Oña, km. 108; Páramo de Carboncilla, km. 125; Saraguro, km. 147; Nudo de Guagrauma and Loma de Oro, km. 159. From here to Loja the kilometers had not been marked.

Páramo—Treeless areas at the higher elevations in the Andes, in Ecuador usually being above 10,500 ft. Alphabetized by place name and not under páramo.

Parroquia—"Parish"; used by F. Prieto. These minor places have been located on labels with reference to places on the 1/m map.

Partidero, Cerro—Just west of Mendez and south of the Río Paute; Map 2.

Partidero, El—A locality with scattered farm settlements on the Cerro Partidero (q.v.).

Patí (Jivaria of)—Ghinassi transliterates this common personal name as Patéhi, and it is so used in pertinent passages in this account. I listened with special care to the pronunciation of this name as given by "Patéhi" himself, and wrote the above; what I did not then know was that the last syllables are often modified or dropped in informal conversation in Jivaro. The name Patéhi means "second born."

Patos, Río—Confluent with the Río Negro; Map 1.

Pilas, Tambo—Misspelled on some labels; should be Pailas. Valley of the Río Negro opposite the Río Patos, near the Río Pailas. Map 1.

Portovelo—Prov. El Oro, just south of Zaruma; incorrectly listed on 1/m map as Portoviejo.

Pupazche—An area with habitations on the erosion benches between the town of Paute and the Huatracaja upland (q.v.).

Puyo—A small village in the Oriente beyond Mera.

Quebrada Gualacéo—A steep walled valley in the Cerros Huashinán south of El Pan.

Saraguro—The spelling varies, certain semi-official maps in Ecuador apparently prefer this over Zaraguro.

Sevilla de Oro—SE of the town of Paute, on the eastern shoulder of the valley of the Río Collay opposite El Pan (Pan of the 1/m map); Map 1.

Sta. Elena—West of Mendez; Map 1.

Sotobosque—Tangled and at times almost impenetrable dwarf forest, usually a typical "mossy forest," at high elevations between the upper forest and the páramo.

Surucucho—A glacial lake and valley W of Cuenca and surrounded by the Páramo des Soldados. (See Jour. N.Y. Bot. Gard. 47:25–31, 1946, for account of area and photographs.)

Suscal—Directly west of Tambo.

Tambo—Map 1. Until late 1945 the terminus of the branch of the railroad running south from Sibambe; track was then being laid on to Biblian. *Also* a rest house along a trail; where appearing as part of a name, it is not used in this index for alphabetizing purposes. For the most part tambos are ephemeral places, since the muledrivers have the habit of tearing them up for firewood. Many place names on parts of the 1/m map once were tambos, but no longer exist.

Tayuza, Río—Map 2 and 1/m map; confluent with the Río Upano just north of Mendez.

Tigre, El and Río—Area of settlement where the Río Tigre enters the Pastaza just east of El Topo (q.v.).

Tinajillas, Paramo de—Upper part of Cord. de Alpachaca (q.v.) about 20 km SW of Cumbe.

Tintas, Río—A branch of the Río El Cruzado, in the Oriente SE of (El) Pan; Map 1. Future workers should know that this is the same area as that collected in by Dr. Julian A. Steyermark in 1943, probably under the locality name of the "Arenillas Region."

Toma, La—A small village west of Loja in the valley of the Río Catamayo; actually applied to the sandy, arid areas between the Ríos La Toma and Guyaba above their confluences with the Río Catamayo.

Topo, El—A place along the Río Pastaza east of Baños, notable only as a station where trucks taking Naranjilla (*Solanum quitoense*) to the uplands pick up their major cargoes.

Tres Ranchos—West of Mendez; Map 1.

Vilcabamba—About 38 km. S of Loja. This is listed on some local maps as La Victoria.

Yapi, Río—Map 2, east of Cord. Cutucú.

Yucal—A region N of the Río Paute about 5 km. west of Mendez.

Zapote area—On trail, Gualaceo to Indanza; Map 1.

Zaraguro—See Saraguro.

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PLANTS COLLECTED IN ECUADOR BY W. H. CAMP.

BROMELIACEAE, CANNACEAE, ETC.

Lyman B. Smith

BROMELIACEAE

Subfamily 1. Pitcairnioideae

Puya aequatorialis André.

Azuay: coarse much-branched plants, firmly attached to soil, leaves pale green above, silvery-scurfy below, flowering spikes to 2 m., the lower half bare except for scattered bracts; the first flowers loose on the spike, the upper crowded, sepals green under the scurf, petals green at base, a dark greenish-blue above, becoming reddish after anthesis, anthers bright yellow, "Achupilla," very common on steep slopes; between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7,200–8,000 ft., (dry cliffs, rocky hillsides and occasional ravines), *E-2322.*

Puya glomerifera Mez & Sodiro.

León: in clumps, plants branched, in open, subprostrate, in chaparral, branches arched upward, flowering spikes to 1.5 m., flowers bluish-green; Páramo de Chasqui, 12,000 ft., *E-2349.*

Puya gummifera Mez & Sodiro.

Azuay: single plants, basal leaves in dense rosette, flowering spike to 2.5 m., lower bracts subtending flower clusters leaflike to 20 cm. long, upper bracts 2–3 cm. long, thin, calyces basally green, apically yellowish, covered with brownish scurf, corolla a pale greenish "isabellina" (i. e. a dirty white with greenish tinge), base of plant, especially the expanded leaf base, eaten by the common people and said to be "good for the kidneys," also fed to cattle, pigs, etc., this probably explains why the plant is rather rare; along the Río Cumbe, 25-30 km. south of Cuenca, 9,300-10,000 ft., *E-2202.* Leaves pale green, nitid, especially above, spines basally pale, apically brown, flowering spikes to 3 m., flowers creamy white with greenish tinge, favorite food for bear, stems also fed to pigs and "cuys" (guinea pigs); quebrada leading into the Río Collay, 3-8 km. north of Sevilla de Oro, 7,000-8,300 ft., *E-5198.*

Puya hamata L. B. Smith

Azuay: inflorescence spikes bracteate and lanate, to 5 m., fruits on upper 2 m., leaves in dense rosette, "Achupalla-cimarona"; although a conspicuous element of the open páramos, this species probably originally inhabited the occasional rocky declivities and cliffs of the region, where it is still present; certainly it is never seen in undisturbed chaparral or slope-forest. With clearing, it moves onto the pastures and meadows, where it becomes a pest. This species dies after flowering and fruiting. The older plants seem to be resistant to the usual páramo grass-fires, although the younger ones perish. The usual method of control is to cut off the inflorescence at the time of flowering and before the seed is mature. When passing this area some months ago, the flowers were noted to be "blue." As the fruit matures, the outer leaves become sharply reflexed, bending to the ground. So far as known, this area is the southernmost station for the species in Ecuador; at least it was not seen on any of the páramos south of here.

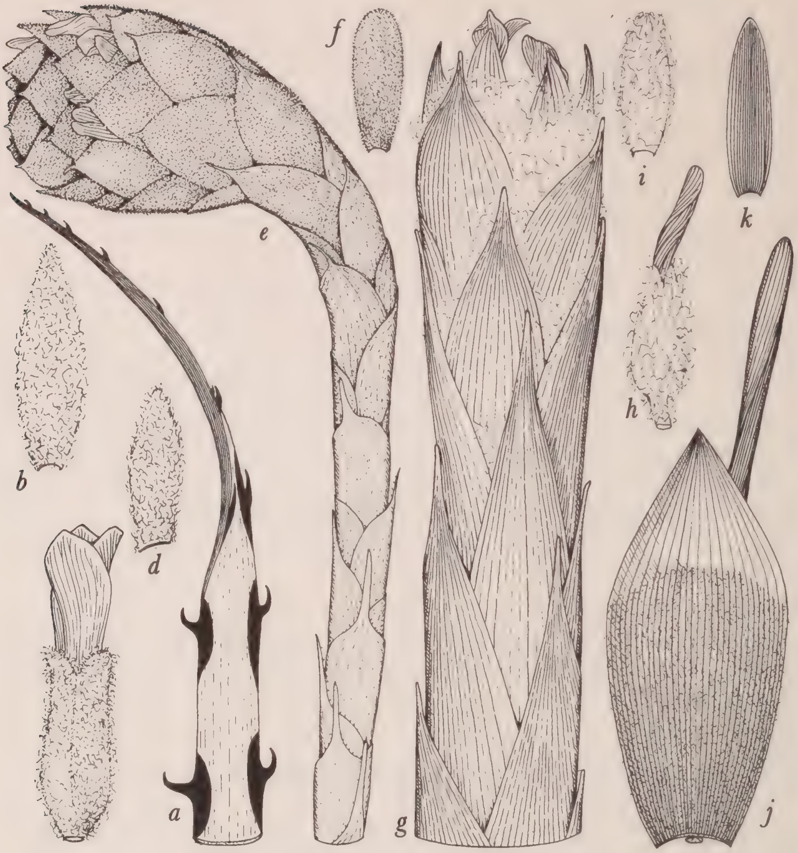

Fig. 1: a, *Puya maculata* L. B. Smith, apex of leaf × 1; b, floral bract × 1; c, flower × 1; d, sepal × 1; e, *Puya nutans* L. B. Smith, upper scape and inflorescence × 0.5; f, sepal × 1; g, *Puya pygmaea* L. B. Smith, upper scape and inflorescence × 1; h, flower × 1; i, sepal × 1; j, *Pitcairnia Campii* L. B. Smith, floral bract and flower × 1; k, sepal × 1.

Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, 10,000–10,500 ft., E-2082.

Puya maculata L. B. Smith, sp. nov. Fig. 1, a–d.

Herba 5-6 dm. (raro 1 m.) alta (! Camp); foliis rosulatis, ultra 4 dm. longis, crassis et rigidis sed fragilis et facillime fractis (! Camp), vaginis suborbicularibus, 4 cm. diametro, pallidis, extus ad apicem versus lepidotis, alibi glabris, laminis lineari-triangularibus, pungentibus, basi 4 cm. latis, supra glabris lucidisque, pallide viridibus sed sub spinis insigniter atro-maculatis, subtus minute albo-lepidotis inter nervos crebros; scapo 12 mm. diametro, brunneo-flocculoso; scapi bracteis dense imbricatis, infimis foliaceis, supremis ovatis, acuminatis, fere integris, ex sicco subpapyraceis, brunneo-lanosis; inflorescentia strobiliformi-clavata, 15 cm. longa, 5 cm. diametro, brunneo-lanosa; bracteis primariis erectis, floribus fere occultantibus, supremis scapi similibus; ramis abortivis, flores 3 fasciculatos gerentibus; bracteis florigeris ellipticis, acutis, sepala superantibus, tenuibus; pedicellis obconicis, 6 mm. longis, sepalis oblongo-lanceolatis, subacutis, 21 mm. longis, ecarinatis, subcoriaceis; petalis 4 cm. longis, atro-caeruleis (! Camp).

Azuay: in open páramo, Páramo del Castillo, crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez, 11,000–11,300 ft., August 21, 1945, *Camp E-4882.*

The curious dark spots at the base of the leaf-spines in *Puya maculata* constitute a character that is unique in the genus. The more technical characters of the species indicate affinity with *P. clava-herculis* Mez & Sodiro, but it differs from that in the erect primary bracts and subacute rather than acuminate sepals.

Puya nutans L. B. Smith, sp. nov. Fig. 1, e, f.

Herba acaulis, 55 cm. alta; foliis plurimis, densissime rosulatis, vaginis suborbicularibus, 35 mm. diametro, extus atro-castaneis, apice adpresse lepidotis, alibi glabris, laminis lineari-triangularibus, pungentibus, 15 cm. longis, basi 12 mm. latis, supra glabris lucidisque, subtus membrana e lepidibus cinereis formata obtectis; scapo ad apicem versus leviter decurvato, 15 mm. diametro, leviter ferrugineo-lanoso, mox glabro; scapi vaginis erectis, imbricatis, infimis subfoliaceis, alteris latissime ellipticis, serrulatis, ex sicco tenuibus, atris, apice laminis linearibus gradatim brevioribus praeditis; inflorescentia nutans, simplicissima, dense strobiliformi, subglobosa, sub anthesin ca. 5 cm. diametro; bracteis florigeris eis scapi similibus sed apiculatis et obscure denticulatis, sepala superantibus; pedicellis ca. 5 mm. longis, robustis; sepalis anguste obovatis, late obtusis, 18 mm. longis, densissime ferrugineo-stellatis; petalis 4 cm. longis, pallide viridibus (! Camp).

Azuay: common on Páramo de Tinajillas, 30-50 km. south of Cuenca, 11,000–11,500 ft., March 17, 1945, *Camp E-2291.*

The nodding inflorescence of *Puya nutans* appears to be unique in the genus. Discounting the simple inflorescence which is not a reliable character anyway, *Puya nutans* is probably related to *P. clava-herculis* Mez & Sodiro. The shape of the sepal is obovate in *P. nutans* as against triangular in the other.

Camp notes: "Although thousands of plants were seen, only three inflorescences were seen during the entire day. This plant is partly injured but rarely killed by the usual páramo fires. Its control must be a real problem; and there is little evidence that there is any success in control short of grubbing. Should the high-altitude páramo pasture ever become valuable, the eradication of this pest will be a real problem."

Puya pygmaea L. B. Smith, sp. nov. Fig. 1, g–i.

Herba acaulis, 3 dm. alta; foliis multis, rosulatis, ad 17 cm. longis, vaginis parvis, suborbicularibus, serrulatis, dissite lepidotis, laminis lineari-triangularibus, pungentibus, basi 15 mm. latis, supra glabris lucidisque, subtus dense adpresseque albido-lepidotis, spinis hamatis gracilibus brunneis 2.5 mm. longis laxe armatis; scapo gracili sed bracteis inclusis latitudine inflorescentiae fere aequante; scapi bracteis densissime imbricatis, ellipticis, lineari-laminatis vel acuminatis, ex sicco papyraceis, valde nervatis, mox glabris; inflorescentia subsimplici, denssissime strobiliformi, ellipsoidea, 5 cm. longa, 2.5 cm. diametro, albo-lanato; bracteis primariis eis scapi similibus sed minoribus et plus vestitis, sepala multo superantibus, rubris; ramis abortivis cum floribus fasciculatis vel solitariis; bracteis florigeris ellipticis, acutis, carinatis, membranaceis, sepala superantibus; pedicellis brevibus sed gracilibus; sepalis ellipticis, obtusis, 18 mm. longis, tenuibus; petalis 3 cm. longis, viridi-azureis.

Azuay: plants solitary and usually scattered in open páramo, Páramo de Tinajillas, 30-50 km. south of Cuenca, 11,000–11,500 ft., March 17, 1945, *Camp E-2236.*

The inflorescence of *Puya pygmaea* is nearly simple but there are floral bracts in the axils of the lower primary bracts. The species is so closely allied to *Puya* *exigua* Mez that I am proposing it as new with considerable misgiving, especially as my knowledge of *P. exigua* is confined to the description and a photograph. However, the lack of lanate indument on the leaf-apices, the pale color of the indument of the inflorescence and the much larger sepals would indicate that *P. pygmaea* probably merits specific segregation. At the same time this close relationship indicates an Ecuadorian origin for the heretofore doubtful *P. exigua.*

Pitcairnia aphelandraeflora Lem.

Santiago-Zamora ("Oriente"); plants from heavy rhizomatous base, arching over streams, single non-branched stems, to 3 m., inflorescence bracts crimson tipped with green, becoming green in fruit, perianth crimson; growing only at very margin of swift-running mountain streams where subject to frequent torrents of mountain floods, as *Salix* in northern hemisphere, along narrow floodplain of Río Itzintza, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 3,500–3,700 ft., *E-1238.* The petals are appendaged in the above material while in the type they are naked, but this variation has been recorded in a number of species in *Pitcairnia* already. The apparently unique character of naked ovules is shown distinctly by both collections.

Pitcairnia campii L. B. Smith, sp. nov. Fig. 1, j, k.

Florifera 3 m. alta (! Camp); vaginis foliorum 2 dm. longis, amplis, densissime adpresseque brunneo-lanosis, basi-atro-castaneis, laminis dimorphis, alteris valde reductis, linearibus, 2 mm. latis, spinis uncinatis atris laxe armatis, alteris cum vaginis et petiolo lato canaliculato serrato ad 3 m. longis (! Camp), arcuatis, linearibus, longe acuminatis, 5 cm. latis, basi excepta integris; scapo erecto, basi 2 cm. diametro, pallide flocculoso; scapi bracteis erectis, densissime imbricatis, ellipticis, pallide flocculosis, infimis longe acuminatis et ad apicem versus spinis atris subdense armatis, supremis acutis, integris; inflorescentia simplicissima, gracile cylindrica, multiflora, 2-3 cm. diametro, petalis exceptis pallide flocculosa; bracteis florigeris erectis vel apice paulo divergentibus, supremis scapi similibus, ad 6 cm. longis sepala bene superantibus; floribus subsessilibus; sepalis anguste oblongis, late acutis apiculatisque, 28 mm. longis, ecarinatis; petalis nudis, 7 cm. longis, fulgide aureis (! Camp); staminibus inclusis, ovario 5/6 supero; ovulis longe caudatis.

Junction of Guayas, Cañar, Chimborazo and Bolívar: on steep banks and cliffs, foothills of the western cordillera near the village of Bucay, 1,000-1,250 ft., June 8–15, 1945, *Camp E-3661.*

In Mez's key in the Pflanzenreich *Pitcairnia campii* would fall next to the Mexican *P. imbricata*, from which it differs in its great size and in its serrate lower scape-bracts.

Pitcairnia heterophylla (Lindl.) Beer.

Chimborazo: plants usually leafless at this season (June 19), corolla crimson; on dry rock-faces, cañon of the Río Chanchan from Naranjapata to below Huigra, 2,000–3,000 ft., *E-3888.*

Pitcairnia pungens HBK.

Chimborazo-Cañar border: on rocky outcrops; lower bracts reddish, upper nitid, green, nigrescent-tipped, calyx yellow, margins and tip red-orange, corolla crimson, filaments pale crimson; anthers yellow; in Quichua: "Urcú-huicundo" (Urcu—mountain; huicundo—name applied to this general type of plant); western escarpment, near El Tambo, 10,000-11,500 ft., *E-4085.* Cañar: floral parts deep salmony-scarlet; between Suscal and Chontamarca, north rim of the valley of the Río de Cañar, *E-2871.* Azuay: roots, ground and cooked, used as diuretic; plants branched at base, bracts green, with purple bases, perianth scarlet, anthers yellow, "Quinde

Sungana"; on rock, along the Río Matadero, west of Cuenca, 8,500-9,000 ft., *E-1940*. Perianth segments salmon at base, apically crimson, anthers bright yellow, "Quinde-Sangana," root is ground and infusion made which is said to be good for kidneys and liver; Pacific side of pass, Nudo de Portete, pass between headwaters of the Ríos Tarqui (Atlantic) and Giron (Pacific), ca. 9,000 ft., *E-2172*.

Subfamily 2. Tillandsioideae

Tillandsia complanata Benth.

Cañar: epiphyte, leaves purplish mottled, inflorescences about 5 per leaf-axil, bracts crimson, corolla magenta-pink; uplands called "Huairacaja," 10-20 km. northeast of Azogues, 11,000 ft., *E-1753*. Azuay: epiphytic, leaves green, flecked with purple, or blotched, peduncles pale green, upper bracts rosy-pink, corolla lavender-pink, Cruz Pamba region above Baños (ca. 15 km. southwest of Cuenca), 9,000–10,000 ft., *M. Giler & F. Prieto*, *E-3957A*, same, leaves completely reddish-purple on both surfaces, *M. Giler & F. Prieto*, *E-3957B*.

Tillandsia floribunda HBK.

Chimborazo: on dry cliff; inflorescence bracts purplish-red, perianth segments lavender-purple; cañon of the Río Chanchan near Huigra, 4,000–4,500 ft., (mostly scrub-chaparral, with a few seepages and small swamps along the river), *E-3115*. On rocks; inflorescence bracts rose-magenta; cañon of the Río Chanchan, from Naranjapata to below Huigra, 2,000–3,000 ft., *E-3860*.

Tillandsia Hamaleana E. Morr.

Chimborazo: leaves purple outside, pale green with purple spots inside, bracts pale green, spotted with purple; on dry rock, cañon of the Río Chanchan, from Naranjapata to below Huigra, 2,000–3,000 ft., *E-3898*.

Tillandsia latifolia Meyen **var. divaricata** (Benth.) Mez.

Azuay: on cliffs; plants coarse, much-branched, usually loosely attached so that when one part is pulled down a meter or more of stem and attached branches also comes down, leaves silvery, peduncles and bracts red-orange, becoming pale brown in fruit, flowers pale bluish, "Guicundo"; between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca; 7,200–8,000 ft., (dry cliffs, rocky hillsides and occasional ravines), *E-2303*.

Tillandsia narthecioides Presl.

Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolívar: epiphyte, leaves deep green, peduncle and bracts purple, flowers white, fruit green; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3676*.

Tillandsia pendulispica Mez.

Santiago-Zamora ("Oriente"): Epiphyte, bracts bright red-orange, ridge top south and west of Río Itzintza, 5,900–6,000 ft., Cordillera Cutucú, ca. 2° 40′ S., 78° W., *E-1385*. Same locality, plants epiphytic in small clusters, bases radiate from common center, leaf bases and lower bracts reddish-purple, blades bright green, shining, peduncle and its bracts red-orange, outer perianth parts cream yellow, inner sulphur-yellow, *E-1392*.

Tillandsia secunda HBK.

Azuay: plant epiphytic, flowering spike 3 m. long with about 40 lateral branches, bracts bright yellow, before anthesis, buds lateral, at anthesis, individual pedicels turn sharply downward, calyces green, stiff, notably fibrous, at anthesis, only 2–3 mm. of corolla exposed, tips of petals flared, lower half of petals white, upper half deep purplish blue, leaves in massive rosette, notably pale green not mottled; the eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft., *E-4592*.

Tillandsia tetrantha R. & P. var. **densiflora** (André) L. B. Smith.

Chimborazo-Cañar border: epiphyte, leaves pale green, base inside nigrescent purple, flowering spike and bracts salmon pink, calyx yellow with salmon tint, corolla deep yellow; (western escarpment), near Tipococha, 9,800–10,400 ft., *E-4079*.

Tillandsia tetrantha R. & P. var. **scarlatina** (André) L. B. Smith.

Epiphyte, leaves green above, often with purplish spots, clasping bases usually nigrescent-purple, peduncles and bracts orange-crimson, sepals red-orange below, yellow above, corolla bright yellow; the eastern cordillera, 4–6 km. north of the village of Sevilla de Oro, 9,000–10,000 ft., *E-4685*.

Tillandsia usneoides L.

Azuay: sparse, seen hanging from a few plants in the cañon; between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7,200–8,000 ft., (dry cliffs, rocky hillsides and occasional ravines), *E-2348*. Loja: hanging from trees, Malacatos Valley, 25 km. south of Loja, about 5,000 ft., *E-126*.

Vriesia arpocalyx (André) L. B. Smith.

Azuay: in loose colonies, leaves gray-green, inflorescence spike light pink; on nearly sheer dry cliff, between Ríos Azogues and Gualaceo, valley of the Río Paute, between Paute and Cuenca, 7,200–8,000 ft., *E-2345*.

Vriesia Barclayana (Baker) L. B. Smith.

Chimborazo: on rock; leaves pale green, bracts brown-scurfy; cañon of the Río Chanchan, from Naranjapata to below Huigra, 2,000–3,000 ft., *E-3899*.

Vriesia cylindrica L. B. Smith.

Chimborazo: epiphytic, usually in clumps, leaves pale-green, bracts orange-red, sepals yellow, petals green, margins bright blue, tips deep nigrescent-blue, filaments pale greenish-yellow, anthers nigrescent-blue, style nearly white below, nigrescent-blue in twisted zone, stigma greenish; open deforested slope with small patches of scrub in the draws, directly above the village of Huigra, cañon of the Río Chanchan, 5,000–7,000 ft., *E-3493*. Azuay: epiphyte, bracts salmony-red, sepals pink-tinged, petals pale green, margins and apices deep (almost nigrescent) blue, leaves pale green, not mottled; the eastern cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft., *E-4612*.

Guzmania lingulata (L.) Mez.

Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolívar: epiphyte, leaves light green, inflorescence bracts spreading, forming rosette-like head, bright orange-crimson, tips of bracts in head bright yellow; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3803*.

Guzmania minor Mez var. **flammea** L. B. Smith.

Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolívar: epiphyte, in small colonies, leaves thin, pale green, subnitid, bracts tipped with deep salmon-pink, basally brownish, later, bracts greenish with nigrescent-chestnut bases; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3695*.

Guzmania Pearcei (Baker) L. B. Smith.

Santiago-Zamora ("Oriente"): flowers yellow-greenish, bracts reddish; growing on duff, Cordillera Cutucú, eastern slope and main crest, 6,500 ft., *Jorgensen, CuJ-47*.

Catopsis sessiliflora (R. & P.) Mez.

Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolivar: epiphyte, leaves, pedicel, and fruit light green; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3677.*

Subfamily 3. Bromelioideae

Greigia sodiroana Mez.

Azuay: on soil, inflorescences short, leaves lax, spreading, bright green above, inflorescence bracts chestnut-brown; the eastern cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft., *E-4575.* The primary bracts in this specimen are very obscurely serrulate but it agrees closely with the following collection in all other particulars. Plant on ground, with definite stem, to 0.3 m., inflorescence bracts stiff-coriaceous, basally brown, apically green, corolla bright lavender, individual fruits quite sweet and Giler and Prieto—who have considerable experience in northern Ecuador—say plant is more abundant in northern provinces and fruit is sold in Otovalo market under name of "Pinuela"; the eastern Cordillera, 4–6 km. north of the village of Sevilla de Oro, 9,000–10,000 ft., *E-4704.*

Aechmea Drakeana Andre.

Santiago-Zamora (?): epiphyte, peduncle red, ovary bright pink, perianth brilliant blue; along the Río Negro, 4,600 ft., *Jorgensen, E-930.* Chimborazo: bracts pale green, fruits pink; on soil, moist forested valleys in the afternoon fog-belt, cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft., *E-3465.*

CANNACEAE

Canna edulis Ker.

Azuay: flowers red, leaves used to cover and wrap foods (taking place of ubiquitous banana-leaf of warmer climates), tuberous rhizomes used as food; in Cholo garden, village of Sevilla de Oro, 8,000 ft., *E-5029.*

Canna limbata Rosc.

Chimborazo: plants from short tuberous rhizomes, to 4 m. high, perianth parts deep orange-yellow; moist forested valleys in the afternoon fog-belt, Cañon of the Río Chanchan, about 5 km. north Huigra, 5,000–6,500 ft., *E-3432.*

ZINGIBERACEAE

Renealmia breviscapa Poepp. & Endl.

Chimborazo: plants in clumps, pungent-aromatic, vegetative branches to 2.5 m., leaves dark green above, pale glaucous below, fruits bright red-orange, corolla white, sepals crimson; moist forested valleys in the afternoon fog-belt, cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft., *E-3382.*

Renealmia cernua (Sw.) Macbride.

Santiago-Zamora ("Oriente"): plants colonial, to 3 m. high, bracts basally red, apically yellow, tips becoming green with age, perianth yellow, (inflorescence pungent-fragrant); near Mendez, 1,750–2,500 ft., *E-896.*

Renealmia exaltata L. f.

Guayas: plants in clumps from short heavy rhizomes, vegetative branches to 5 m., sheaths yellow-green, leaves deep green above, paler green below, sepals pale pinkish-yellow, corolla-tube pink below, lobes yellow, fruit pale pink; Coastal Plain, in the vicinity of Naranjito, 120 ft., *E-3600.*

Renealmia aff. geostachys K. Schum.?

Santiago-Zamora ("Oriente"): plants in colonies, 2.5–3 m. high, inflorescence from rhizome, to 0.3 m., perianth white, pink tinged; ridge ascending into central Cutucú, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 2,600 ft., *E-1124*.

Renealmia thyrsoidea (R. & P.) Poepp. & Endl.

Santiago-Zamora ("Oriente"): plants in large colonies from rhizomatous bases, rhizomes spicy-aromatic, leafy branches to 3 m., inflorescences basal, 1–3 from single base, lower bracts of peduncle red, upper striped red-green, inflorescence bracts clear canary-yellow, perianth parts pale yellow; ridge, western side of Cutucú, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 2,900–3,000 ft., *E-1088*.

Hedychium coronarium Koenig.

Guayas: plants in clumps, to 1.5 m. high, rhizomatous, bracts red, leaves pale green, perianth white, large lobes with greenish tinge in center; coastal plain, in the vicinity of Naranjito, ca. 120 m., *E-3611*.

Costus amazonicus (Loes.) Macbr.

Santiago-Zamora ("Oriente"): plants from rhizomatous base, to 1.5 m., leaves dark green above, pale below, bracts green, outer perianth segments pale yellow, inner salmony-red with yellow veins; from Mendez to crossing of Río Paute, eastern slope of the cordillera, valley of the Ríos Negro and Chupianza on the trail from Sevilla de Oro to Mendez, 1,900–2,100 ft., *E-1504*.

Costus argenteus R. & P.

Guayas: clumps to 6 m. high, leaves deep green above, very pale below, bracts basally crimson, apically green, ovary white, sepals bright red with white tips, petals pale yellow, petaloid stamen pale, with lateral salmon-red stripes, center deep yellow, lateral parts with white pubescence internally; coastal plain, in the vicinity of Naranjito, ca. 120 ft., *E-3607*. Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolívar: plants in clumps from short rhizomes, to 4 m. high, soft hirsute, hairs brownish, leaves dark green, dull above, paler, nitid below, basal portion of bract crimson, upper half and recurved lobe green, ovary white, subtending bract crimson, seeds black with recurved and crumpled subsucculent ribbonlike appendages; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3722*.

Costus cylindricus Jacq.

Junction of Guayas, Cañar, Chimborazo and Bolívar; plants 1.5–2.5 m. from heavy short-branched rhizomes, lower half of stem with sheaths, upper half with leaves, leaves deep green above, silvery below, bracts deep crimson on both sides except for exposed part externally which is crimson with greenish tinge and with distinct yellow line in center, inner bract crimson, ovary white, sepals crimson, corolla salmon, sterile stamen salmon-yellow; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3702*.

Costus laevis R. & P.

Guayas: plants 1 m., leaves pale green, outer bracts crimson externally, internally nigrescent-crimson, inner bract, ovary and sepals deep crimson, petals pale salmon, sterile stamen deep salmon with bright yellow margin and center; coastal plain, in the vicinity of Naranjito, ca. 120 ft., *E-3632*.

MUSACEAE

Heliconia hirsuta L. f.

Guayas: plants 1.5–2 m., from short clumped rhizomes, leaves along stem, bracts deep brownish-red, crimson at basal "joint" and at tip, perianth segments bright yellow, tips bright green, fruits green; coastal plain, in the vicinity of Naranjito, ca. 120 ft., *E-3561.*

Heliconia latispatha Benth.

Guayas: plants in clumps from heavy, much-branched rhizomes, leaves along stem, blades of basal to 1.3 m. long, inflorescence erect, bracts basally yellow, apically and marginally crimson (when expanded, tip green), perianth segments yellow with green margins, immature fruit pale green; coastal plain, in the vicinity of Naranjito, ca. 120 ft., *E-3562.*

Heliconia Schumanniana Loes.

Santiago-Zamora ("Oriente"): plants in clumps, 1.5–2 m., main axis and bract bases deep orange, bract tips and pedicels orange, base of ovary cream-yellow, top of ovary in flower and fruit bright green, perianth canary yellow, leaves green above, glaucous below, but glaucescence wipes off easily; above Río Upano, near junction with Río Paute, near Mendez, 1,750–2,500 ft., *E-959.*

Heliconia villosa Kl.

Junction of Guayas, Cañar, Chimborazo and Bolívar: plants in clumps from short-branched rhizomes, "stems" formed by clasping petioles, elliptic in section, about 5 × 10 cm. in diameter, 3–4 leaves per stem, petioles 4–5 m., the free part 1–2 m. long, oval to subterete in section, except near the blade where channeled, blades 2–3 m. long, flowering peduncles breaking out of "stem" about 2.5 m. from ground, usually with single large bract near base, inflorescence pendant, peduncle about 1 m. long, pale red, set with bright golden-orange pubescence, flowering part of inflorescence about 1 m. long, bracts covering flower series, flowers arching downward from vulvular bracts, 25–28 normal bracts plus a somewhat larger one at morphological base of inflorescence proper or occasionally this and the very large and distant bract omitted and a medium-sized bract at about the middle of the exposed part of the peduncle, bracts deep orange-crimson, margin and tip shining black, base of perianth white, exposed parts pale yellow, set with golden-yellow hairs, fruit deep lavender, protruding from bract when mature, a regal sight in the jungle; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3835.*

MARANTACEAE

Calathea insignis Peters.

Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolívar: plants in clumps from short-branched rhizomes, basal leaves with petioles to 5 m., blades narrowly oval, to 1 m. long, deep green above, paler green below, inflorescence on stem 1–1.5 m. above soil, inflorescences 3, bracts pale yellowish-green, exposed parts of perianth pale yellow, seeds nigrescent-blue with large white aril; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3683.*

Calathea lutea (Aubl.) G. F. W. Mey.

Guayas: plants in clumps from ascending, woody rhizomes, flowering stems to 2 m. or more, petioles to 2.5 m., blades to 1 m. long, leaves deep green above, very glaucous below; coastal plain, in the vicinity of Naranjito, ca. 120 ft., *E-3595.*

Calathea macrosepala K. Schum.

Junction of Guayas, Cañar, Chimborazo and Bolívar: plants in clumps, from short rhizomes, usually only 1 leaf from basal part of stem, upper surface of leaves bright green, lower pale green but not glaucous, outer bracts pale green, inner pale green with sterile (?) bracts in axils, apparently usually 2 fertile flowers, outer (or sheathing) perianth segments nigrescent-purple, inner segments (or sterile stamens?) salmony yellow, seeds gunpowder-blue, short aril; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3783.*

Calathea nodosa Rusby.

Santiago-Zamora ("Oriente"): plants from rhizomatous base, petioles to 2 m., corolla pale white with purplish tinge, branch accompanying inflorescence droops over later and takes root, axillary branch becoming new plant; Cordillera Cutucú, ca. 2° 40′ S., 78° W., 3,500–3,700 ft., *E-1234.*

Calathea peruviana Koern.

Santiago-Zamora ("Oriente"): plants from short rhizomatous bases, upper surface of leaves variegated with three shades of green in perfect scalloped pattern, lower surface with red and green, peduncle reddish, lower (flowering) bracts yellow-green, upper (non-flowering) forming corona-like structure and deep green with red margins on outside, perianth white with purple tinge; Cordillera Cutucú, ca. 2° 40′ S., 78° W., 3,900 ft., *E-1108.* A variety with nearly glabrous leaves.

Calathea picturata K. Koch & Lind. ex char.

Junction of Guayas, Cañar, Chimborazo and Bolívar: in clumps from short offshoots, leaf dark green with light green zones along center vein and also about half way to margin above, lower surface suffused with purple, bracts purplish, flower parts white; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3844.*

Myrosma stromanthoides Macbride.

Santiago-Zamora ("Oriente"): plants in colonies from short rhizomes, petioles to 2 m., blades 0.4–0.8 m. long, inflorescence about 1 m. above ground level, bracts and perianth parts yellow-orange, connection between blade and petiole "jointed"; ridge, western side of Cutucú, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 2,900–3,000 ft., *E-1087.*

Pleiostachya Morlaei (Eggers) K. Schum.

Guayas: plants in clumps, rhizomatous, petioles of lower leaves to 2 m., blade to 1 m., deep green above and below, veins red below, inflorescence in branched series at several levels, sepals pale yellow, 2 corolla segments yellow, 3rd large, lavender; coastal plain, in the vicinity of Naranjito, ca. 120 ft., *E-3594.*

PLANTS COLLECTED IN ECUADOR BY W. H. CAMP.

XYRIDACEAE

LYMAN B. SMITH AND JESÚS M. IDROBO

Xyris acutifolia (Heimerl) Malme.

Plants in tufts in mossy swamp, all flower parts bright yellow, bracts deep chestnut brown, small mass of crisp pubescence, yellow, in flower (pubescence of staminodes); *F. Prieto P-306.*

Xyris subulata R. & P.

Azuay-"Oriente" border; plants tufted, flowers yellow; in swamp, Eastern Cordillera, between Oña and the Río Yacuambi, 8,000–9,500 ft., *F. Prieto P-225.*

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PLANTS COLLECTED IN ECUADOR BY W. H. CAMP.
BEGONIACEAE

LYMAN B. SMITH AND BERNICE G. SCHUBERT

Begonia acerifolia HBK.

Loja: flowers white, petals frilled, corolla 3 cm. diameter; when immature the large wing of fruit pink, the smaller wings pale green; petioles and pedicels bright salmon color; leaf-blades concolor, dull green (one plant found with variegated leaves); plant rhizomatous, the rhizomes and often the plant base enlarged and tuberous; in moist shaded places, Nudo de Cajanuma, 7 km. south of Loja, 8,000–8,400 ft., *E-121*.

Begonia aequatorialis Smith & Schubert.

Chimborazo: plants on soil (or sometimes epiphytic), from short tuberous rhizomes; leaves deep green above, pale below; perianth segments rosy pink; Cañon of the Río Chanchan, about 5 km. north of Huigra, moist forested valleys in the afternoon fog-belt, 5,000–6,500 ft., *E-3268*.

Begonia aeranthos Smith & Schubert, sp. nov. Fig. 2.

Herba e fragmentis solum cognita, alte scandens (! Camp), nodis radicans, omnino glabra; foliis 3–7 mm. supra basin peltatis, rectis vel paulo obliquis, paulo asymmetricis, ovatis, ad 24 cm. longis, 7–11 cm. latis, abrupte acuminatis, basi late truncatis, margine leviter undulatis, minute sparseque denticulatis,

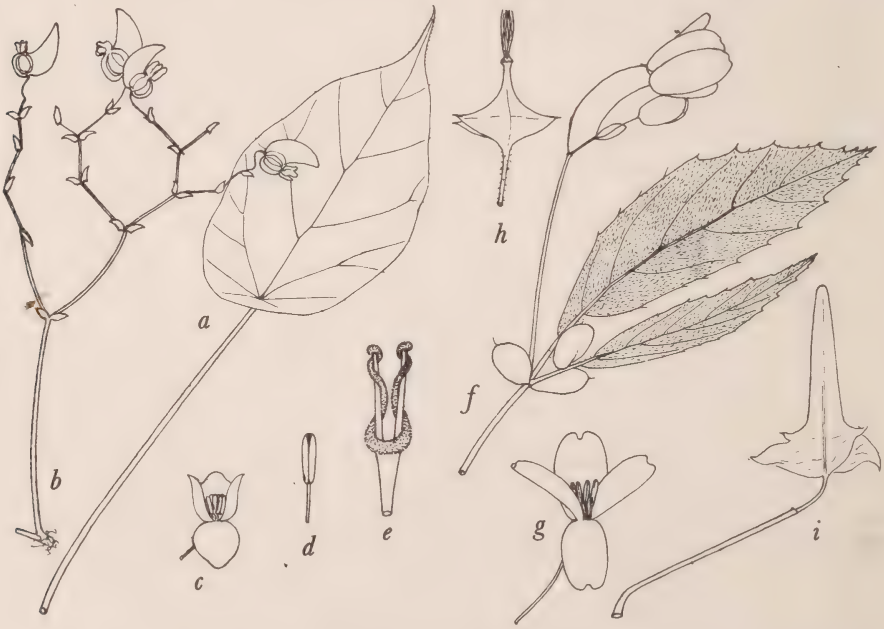

Fig. 2: a, *Begonia aeranthos* Smith & Schubert, leaf × 0.25; b, inflorescence × 0.25; c, staminate flower × 1; d, stamen × 5; e, style × 5; f, *Begonia valvata* Smith & Schubert, branchlet × 1; g, staminate flower × 1; h, young capsule × 1; i, old capsule and peduncle × 1.

petiolis 5–20 cm. longis, stipulis mox deciduis, ignotis; pedunculis ad 11 cm. longis, inflorescentiis ample laxeque cymosis, multifloris; bracteis persistentibus, ovatis, acutis, infimis 7 mm. longis; tepalis masculinis 4, rubris, 8–10 mm. longis, obtusis, integris, exterioribus latissime ovatis, interioribus oblongis; staminibus paucis, liberis, antheris oblongis, apice truncatis, quam filamentis paulo longioribus; floribus femineis persenilibus et in parte delapsis solum cognitis sed cicatribus indicatis tepalis 5 praeditis, tepalis verisimiliter aequalibus, obovatis, obtusis, 14 mm. longis, integris; stylis 3, basi breviter connatis, profunde bifidis, stigmatibus linearibus, spiraliter tortis, placentis integris; capsula subglobosa, 1 cm. diametro, valde inaequaliter alata, ala maxima late ovata, ascendente, 3 cm. longa reliquis marginiformibus; seminibus cylindricis, apice subtruncatis et quadrato-reticulatis, medio reticulis anguste oblongis praeditis.

Santiago-Zamora ("Oriente"): climbing, flowers deep red; ridge ascending into central Cutucú, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 4,400–4,700 ft., Nov. 17-Dec. 5, 1944, *Camp E-1143*. High climber, leaves dark green above, reddish below, perianth parts and fruit bright crimson; ridge just south and west of Río Itzintza, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 4,500–5,500 ft., Nov. 17-Dec. 5, 1944, *Camp E-1317* (type).

At first glance *Begonia aeranthos* appears to be an oversize specimen of *B. glabra*, but the peltate leaves and falcate-ascending capsule-wings contradict that identity. Further the linear spiral stigmas of *B. aeranthos* bar it from section *Pritzelia* where *B. glabra* is. In fact, *B. aeranthos* does not fit any of the sections used by Irmscher in the Pflanzenreich, and requires either the broader definition of *Pritzelia* or the making of a new section.

Begonia albomaculata C. DC.

El Oro: plants erect, 0.5 m., perianth segments pink; in Moro-Moro region (about 21 miles west of Portovelo), in dense rain forest, 3,400–4,200 ft., *E-618*.

Begonia buddleiaefolia A. DC.

Santiago-Zamora ("Oriente"): to 0.3 m., flowers red, leaves reddish below; on rocks, between Hacienda Chontal and Santa Elena, 3,400–4,600 ft., eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), *E-819*. Plants 0.4 m., perianth crimson, stamens and style yellow, wings on fruit crimson, leaves very rugose; ridge between Ríos Ontza and Chupiasa, Cordillera Cutucú, ca. 2° 40′ S., 78° W., 4,300–4,700 ft., *E-1189*. Leaves rugulose, yellow-green above, center pale green below, margin red, flowers greenish-yellow, with red tinges, structures becoming red in fruit; El Partidero, between Ríos Paute and Negro, eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), 2,100–3,100 ft., *E-1536*.

Begonia erythrocarpa A. DC.

Chimborazo-Cañar Border (western escarpment): plants scrambling in brush, to 4 m. long, often essentially leafless at this season (July 6–9), leaves often with small cornucopia-like processes above vein-junction (leaves taken from non-flowering plants and branches), perianths of both flowers white, ruffled, outer pair of segments often pink-flushed; between Santa Rosa (8,300 ft.) and Joyagshi (9,000 ft.), *E-4023*. Chimborazo: plants supported in shrubs, on soil, or in fog-forest sometimes epiphytic, plants often much branched near base, with fibrous roots, and branches to 5 m. long, leaves deep green, nitid above, pale below, perianth-segments ruffled, white, outermost with pink flush, ovary with one large wing and 2 marginal and 3 vascular ridges; cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft., (moist forested valleys in the afternoon fog-belt), *E-3435*. Cañar: rhizomatous, plants to 2 m., leaves glossy above, pallid below, two outer segments of perianth of staminate flower white with pink splotch in center, inner two segments pure white, perianth of pistillate flower white; between Suscal and Chontamarca, north rim of the valley of the Río de Cañar, *Manuel Giler, E-2853*.

Begonia Froebelii A. DC.

Chimborazo: plants tuberous, leaves deep green above, pale-pubescent below, peduncles pink, pedicels deep pink to crimson, ovary green with crimson puberulence, perianth-segments of both flowers deep pink to crimson, anthers and stigmas yellow, large plants in shade, small ones on sunny bank, cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft., (moist forested valleys in the afternoon fog-belt), *E-3289*. Cañar: base tuberous, stem red, floral parts bright crimson, between Tambo and Suscal, 2,000–3,000 meters, north rim of the valley of the Río de Cañar, *M. Giler, E-2759*.

Begonia glabra Aubl.

Junction of Provinces of Guayas, Cañar, Chimborazo and Bolivar: plants climbing tree-trunk to 11 m., leaves pale green; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3754*. El Oro: plants climbing to 5 m. or more, flowers white; in Moro-Moro region (about 21 miles west of Portovelo), 3,400–4,200 ft., in dense rain forest, *E-630*. Santiago-Zamora ("Oriente"): to 1.5 m., flowers pink; eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on trail from Sevilla de Oro to Mendez), *E-769*.

Begonia griseocaulis Irmsch.

Chimborazo: stems coarse, to 1 m. high, 10 cm. diameter, leafless at this season; peduncles to 1.5 m. long; bracts pink; flowers white to light pink; nearly mature fruit pale greenish, flushed with pink; cañon of the Río Chanchan, from Naranjapata to below Huigra, 2,000–3,000 ft., *E-3862*.

Begonia guaduensis HBK.

Santiago-Zamora ("Oriente"): erect, 2 meters, flowers white, 10 km. upstream from Zamora, 4,500 ft., valley of the Río Zamora, east of Loja, *E-54*. New to Ecuador.

Begonia Holtonis A. DC. (*B. Schimpfii* Irmscher).

Junction of the Provinces of Guayas, Cañar, Chimborazo and Bolívar: plants much-branched, climbing to several meters, stem and pedicels red, leaves pale green with red margin, flowers flushed with pink; foothills of the western cordillera near the village of Bucay, 1,000–1,250 ft., *E-3662*.

Begonia humilis Ait.

Santiago-Zamora ("Oriente"): low plants on bank; stems red; leaves pale green above, paler below; peduncles bright red; perianths of both male and female flowers white; fruit pale yellow-cream with greenish tint, brown when mature; uplands just south of Río Chupianza, valley of the Río Upano, from the Río Paute north ca. 17 km. to the Chupiangas, 1,950–2,200 ft., *E-1442*.

Begonia Ludwigii Irmsch.

Chimborazo: plants from heavy, usually erect stems, sometimes to 1 m. high and 10 cm. diameter at base, inflorescence peduncles to 1 m. long, petioles to 0.5 m. long, leaves pale green, dull above, green or sometimes reddish-tinged below, flowers white, tinged with pink; cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft., (moist forested valleys in the afternoon fog-belt), *E-3317*.

Begonia Maurandiae A. DC.

Azuay: plants scrambling on bank; the eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft., *E-4269*. Climbing epiphyte; bracts pale green; sepals basally crimson, white band near apex, tip green; "petals" (inner pair) externally crimson, internally pink. Same locality, *E-4430*. Santiago-Zamora ("Oriente"): epiphyte, leaves dark green above, nitid, pale and subnitid below, petioles and peduncles red, outer perianth segments reddish or greenish with red veins, inner segments crimson, anthers yellow-green, only staminate flowers seen; Tambo Consuelo to Tambo Cerro Negro, eastern slope of the cordillera, valley of the Ríos Negro and Chupianza on the trail from Sevilla de Oro to Mendez, 8,000–9,000 ft., *E-1606*. Plant climbing, much-branched; leaves deep green, subnitid above, pale green nitid below; ovary green in flower and immature fruit; mature fruit dead-brown; perianth segments pale green; species apparently dioecious (see also no. 4981 for specimen from this region; between Tambo Consuelo and Tambo Cerro Negro, eastern slopes of the cordillera, valley of the Río Negro, down to the Río Pailas on the trail to Mendez), 8,500–9,500 ft., *Francisco Prieto, E-4974*.

Begonia maynensis A. DC.

Santiago-Zamora ("Oriente"): to 0.3 m., flowers white; uplands west of Río Upano, near Mendez, 1,750–2,500 ft., *E-977*.

Begonia octopetala L'Hérit.

Cañar: plants from bulbous base, peduncles and petioles crimson, outer perianth segments crimson, inner pink to white; near Suscal, north rim of the valley of the Río de Cañar, *M. Giler*, *E-2843*. Between Suscal and Chontamarca, north rim of the valley of the Río de Cañar, *M. Giler*, *E-2891*. (inflorescences only, mixed with leaves and stems of another species resembling *B. acerifolia*).

Begonia parviflora Poepp. & Endl.

Santiago-Zamora ("Oriente"): plants to 4 m., flowers white; El Partidero, between Ríos Paute and Negro, eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), 2,100–3,100 ft., *E-1528*. Plants 2–3 m., leaves seen to 0.75 m. in diameter (these immature), flowers white; Tambo Chontal to Tambo Consuelo, 5,700–8,000 ft., eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), *E-1592*.

Begonia piurensis Smith & Schubert.

Chimborazo: plants 1–2 m., from heavy tuberous base, stems rooting above tuber, stems red, leaves pale green above, usually reddish below, perianth segments white with red veins, or in some plants deep pink; moist forested valleys in the afternoon fog-belt, cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft., *E-3294*. Same, stem and leaves pale green and flowers pure white, relatively few plants mixed in with number *E-3294*, probably genetically controlled, *E-3294B*. New to Ecuador.

Begonia Rossmanniae A. DC.

Santiago-Zamora ("Oriente"): plants erect to 1 m., leaves deep green above, paler below, perianth and fruit deep orange red; Yucal region, above the Río Paute, about 5 km. west of Mendez, 2,400 ft., *Jorgensen*, *E-943*. Epiphytic climbing vine, leaves deep green above, pale below, flowers cream with greenish tinge, fruit becoming brownish at full maturity; ridge ascending into central Cutucú, 2,600 ft., Cordillera Cutucú, ca. 8° 40′ S., 78° W., *F. Prieto*, *E-1132*.

Begonia serotina A. DC.

Junction of the Provinces of Guayas, Cañar, Chimborazo, and Bolívar: plants rhizomatous, rhizomes often contorted, ends erect; leaves deep green above, very pale below; pedicels pale greenish; perianth of both flowers white, with pinkish-pale veins; ovary white with pink tinge at anthesis, pale green later; moist cliff bases in shade; foothills of the western cordillera near the village of Bucay; 1,000–1,250 ft., *E-3716*.

Begonia Urticae L. f.

Azuay: flowers and fruit crimson; the eastern cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft., *E-4346*. To 2 m. leaves deep green above, veins red below, flowers bright crimson; in thicket, same locality; *E-4621*. Loja—"Oriente" Border: perianth segments bright red; stigmas bright crimson or red; stamens pink; fruit red; crest of the Cordillera de Zamora, east of Loja, ca. 10,000 ft., *E-91*. With much the same appearance of No. 91, except perianth segments white, fruit green; *E-92*. Flowers deep red; leaves dark green above, pale below with red veins; plants from thin rhizomes; fruit beaked; wings equal; Nudo de Guagrauma, ca. 12 km. south of Zaraguro, 9,500–10,500 ft., *E-136*.

Begonia valvata Smith & Schubert sp. nov. Fig. 2.

Suffruticosa; ramis hirtellis vel glabris; foliis rectis, asymmetricis, lanceolatis, acuminatis, basi dimidiatis, ad 7 cm. longis et 2 cm. latis, serratis, supra omnino et subtus ad nervos hirtellis, petiolis 13 mm. longis, hirtellis, stipulis tarde deciduis, late ellipticis, 7 mm. longis, integris, apice setiferis, pallide brunneis; pedunculis 30–35 mm. longis; inflorescentiis paucifloris, proterandris; pedicellis masculinis 18 mm. longis; tepalis masculinis 4, subaequalibus, 12 mm. longis, retusis, rubris, exterioribus late ellipticis, juvenilibus insigniter valvatis, interioribus suboblongis; staminibus 4, liberis, antheris oblongis, obtusis, quam filamentis longioribus; tepalis femineis perjuvenilibus solum cognitis, verisimiliter 5, quorum uno multo minore quam reliquis; stylis multifidis, segmentis linearibus; ovario 3-loculato, placentis bicornutis; capsula late turbinata, apice columna alta praedita, aequaliter 3-cornuta; seminibus crasse ellipsoïdeis.

Santiago-Zamora ("Oriente"): flowers crimson; between Santa Elena and Tres Ranchos, eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), 2,900–3,300 ft., Nov. 1, 1944, *Camp E-825*. Leaves deep green above, pale below, veins red, perianth parts orange-crimson; between Tres Ranchos and Chontal, eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), 2,700–5,700 ft., Dec. 15, 1944, *Camp E-1560* (type).

In general habit *Begonia valvata* closely resembles *B. Urticae*, but its four stamens indicate closer affinity with *B. tetrandra*. From this last it differs in its subaequal retuse staminate tepals, elongate anthers, and linear style-branches. We realize that the name *valvata* does not signalize a particularly distinctive character in *Begonia*,—it just happens not to have been used before.

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PLANTS COLLECTED IN ECUADOR BY W. H. CAMP

VACCINIACEAE

A. C. SMITH

In 1944 and 1945, Dr. W. H. Camp made very extensive collections of plants in Ecuador, among which were included approximately 300 numbers of the family Vacciniaceae. Because of his special studies of this family, Dr. Camp's material and field-notes are of the greatest interest and value. At his request the writer has undertaken the identification of these specimens and has described those that appear to represent new species. That there are 29 such species described in this paper reflects on the industry and perspicacity of Dr. Camp and his assistants, F. Prieto and H. Jorgensen, as well as upon the little-known nature of the flora of Ecuador. In this country and in Colombia the Vacciniaceae reach their highest development in America, both as to number of species and diversity.

The first set of the material upon which this paper is based is deposited in the herbarium of the New York Botanical Garden, and a second set in that of the U. S. National Museum. All the specimens of the family collected are cited and are represented in both herbaria unless followed by the annotation "NY only." A few other specimens are mentioned, the place of deposit being shown by the standard symbols: A (Arnold Arboretum); Ch (Chicago Natural History Museum); NY (New York Botanical Garden); US (U. S. National Herbarium). Genera are discussed in the sequence proposed by H. Sleumer's "Vaccinioideen-Studien" (Bot. Jahrb. **71**: 375–408. 1941).

Gaylussacia loxensis Sleumer, Bot. Jahrb. **71**: 384. 1941.

Azuay: "Oriente" Border, east slope of Eastern Cordillera, between Oña and the Río Yacuambi, 8,000–9,500 ft. elev., *F. Prieto P-265* (NY only) (shrub 1 m.; corolla bright pink).

This unicate collection agrees very well with the original description of *G. loxensis*, but I have not compared it directly with type material (*Lehmann 4965* pro parte). As compared with the description, our specimen differs only in its somewhat more pilose flowers and slightly longer corolla (to 9 mm. long at anthesis).

Themistoclesia inflata A. C. Smith, sp. nov.

Frutex epiphyticus pendulus, ramulis gracillimis elongatis cinereis juventute obscure puberulis mox glabratis; petiolis subteretibus incrassatis rugulosis 2–2.5 mm. longis; laminis in vivo succulentibus inflatisque in sicco coriaceis fuscis, ovato-ellipticis, 3.5–6 cm. longis, 1.5–3.2 cm. latis, ad basim truncato-rotundatum vel minute auriculatum gradatim angustatis, apice in acuminem circiter 1 cm. longum acutum terminantibus, margine incrassatis et leviter recurvatis, supra glabris, subtus pilos breves castaneos glandulosos in foveolis minutis depressos gerentibus, e basi ut videtur 5-nerviis, costa et nervis secundariis supra inconspicue impressis vel ut venulis immersis; floribus supra-axillaribus ut videtur solitariis vel paucis in rhachi minuta subfasciculatis, bracteis oblongis acutis haud 1 mm. longis hispidulo-marginatis; pedicellis gracilibus sub anthesi 12–17 mm. longis leviter curvatis pilis albidis 0.2–0.3 mm. longis copiose hispidulo-puberulis basim versus obscure bibracteolatis, bracteolis subulatis haud 0.5 mm. longis caducis; calyce turbinato sub anthesi 5–6 mm. longo et circiter 4 mm. apice diametro ut pedicellis puberulo, tubo inconspicue 5-angulato 3–4 mm. longo, limbo suberecto quam tubo breviore intus glabro inconspicue 5-lobato, lobis late

deltoideis apiculatis 0.5–1 mm. longis, sinibus rotundatis; disco annulari-pulvinato glabro; corolla glabra tenuiter carnosa late urceolata circiter 7 mm. longa et medium versus 4.5 mm. diametro, basi et apice paullo angustata, lobis 5 deltoideis subacutis circiter 1.5 × 2 mm. sub anthesi reflexis; staminibus 10 longitudine corollam fere aequantibus leviter inaequalibus, filamentis pallidis ligulatis liberis alternatim circiter 1.5 mm. et 1.8 mm. longis superne pilis circiter 0.5 mm. longis dorso hispidulis, antheris 4.5–5 mm. longis, thecis granulatis 1.7–2 mm. longis basi obscure mucronulatis, tubulis gracillimis quam thecis longioribus et multo angustioribus per rimas circiter 0.5 mm. longas dehiscentibus; stylo tereti corollam subaequante basim versus leviter incrassato, stigmate minuto.

Chimborazo: Cañon of the Río Chanchan, about 5 km. north of Huigra, 5,000–6,500 ft. elev. (moist forested valleys in the afternoon fog-belt), May 19–28, 1945, *Camp E-3363* (TYPE US 1,989,082; dupl. NY) (hanging epiphyte; leaves crisp-succulent, to 4 mm. thick, dark translucent-green, inflated above, pale below with stomata, the surface with numerous pits, the bases of glands; lower ⅓ of the leaf in cross-section with chlorenchyma, the upper ⅔ with apparently 4 cell-layers of hydrenchyma; corolla cream-white, the anthers orange).

This very distinct species is most closely allied to the Colombian *T. rostrata* A. C. Smith, from which it differs in having its leaf-blades somewhat smaller, narrower at base, thicker and inflated when fresh, and with immersed venation and gland-hairs sunk in small pits on the lower surface. The new species is further distinguished by its very slender anther-tubules, which are not characteristic of *Themistoclesia*. Slender tubules of this type have been noted in the Colombian *T. crassifolia* Sleumer (Bot. Jahrb. 71: 392. 1941), to which *T. inflata* is also allied. However, *T. crassifolia* has much larger and obviously cordate leaf-blades and an elongate inflorescence, among other characters which distinguish it from the new species.

Themistoclesia cutucuensis A. C. Smith, sp. nov.

Frutex epiphyticus, ramulis gracilibus fuscis obtuse angulatis juventute albido-puberulis mox glabratis; stipulis intrapetiolaribus subulatis 3–5 mm. longis primo puberulis; petiolis leviter canaliculatis 2–5 mm. longis ut ramulis puberulis; laminis chartaceis vel subcoriaceis in sicco pallide viridibus vel metallico-olivaceis, anguste elliptico-oblongis, (4–)6–10 cm. longis, (1.2–)1.5–2.5 cm. latis, basi anguste rotundatis vel subcordatis, apice angustato obtusis, margine integris valde revolutis, juvenilibus utrinque parce strigillosis (pilis brevibus castaneis glandulosis) etiam puberulis, supra mox subtus demum glabratis, costa supra impressa subtus elevata, nervis secundariis principalibus utrinsecus 2 vel 3 inconspicuis e costa basim versus orientibus utrinque prominulis, rete venularum utrinque prominulo vel subimmerso; inflorescentia axillari solitaria racemosa 8–12-flora bracteis paucis papyraceis lanceolatis 3–5 mm. longis parce puberulis basi circumdata, rhachi gracili angulata sub anthesi pedunculo 1–2 cm. longo incluso 5–11 cm. longa albido-puberula, bracteis sub floribus acuminatis ut eis basi inflorescentiae; pedicellis gracilibus sub anthesi 7–12 mm. longis ut rhachi puberulis, superne parce glanduloso-strigillosis, medium versus bibracteolatis, bracteolis ut bracteis sed 1.5–2 mm. longis; calyce sub anthesi 5–6 mm. longo et apice circiter 3 mm. diametro parce puberulo, tubo 5-angulato 3–3.5 mm. longo parce glanduloso-strigilloso, limbo erecto submembranaceo profunde 5-lobato, lobis elongato-deltoideis 1.5–2.5 mm. longis acutis, sinibus acutis; disco annulari glabro; corolla submembranacea urceolato-cylindrica sub anthesi 7–9 mm. longa et basim versus alis inclusis circiter 3 mm. diametro, superne angustata et pallide puberula, 5-alata, alis basim versus 0.6–1 mm. latis superne angustioribus, lobis deltoideo-lanceolatis circiter 2 mm. longis; staminibus 10, filamentis inconspicuis liberis ligulatis glabris circiter 1 mm. longis, antheris 6.5-7 mm. longis, thecis 1.5-1.8 mm. longis basi obscure mucronulatis, tubulis quam thecis triplo longioribus per rimas elongatas dehiscentibus; stylo filiformi corollam subaequante, stigmate minuto.

Santiago-Zamora: Cordillera Cutucú, east-trending slope from top of ridge down toward the Itzintza, 4,800-5,800 ft. elev., Nov. 17-Dec. 5, 1944, *Camp E-1366* (TYPE US 1,989,018; dupl. NY) (high-growing epiphyte, a semi-vine; leaves dark green above, pale beneath). Same locality, ridge just south and west of Río Itzintza, 4,500 to 5,900 ft. elev., *Camp E-1330, E-1342* (high-growing epiphytes, brought down by storm; leaves shining on both sides).

The closest relative of the new species appears to be *T. schultzeae* Sleumer (Bot. Jahrb. 71: 393. 1941), which also occurs in the "Oriente" of Ecuador. From this, *T. cutucuensis* differs in its somewhat larger leaves and inflorescences, and especially in its larger calyx with elongate lobes and sharp sinuses, its winged corolla, and its differently proportioned anthers, of which the thecae are much shorter and the tubules proportionately longer. The occurrence of a winged corolla in *Themistoclesia* has otherwise been noted in the Colombian *T. pterota* A. C. Smith (Jour. Arnold Arb. 27: 103. 1946), which has broader and deeply cordate leaf-blades, a minutely denticulate calyx-limb, and a more strongly urceolate corolla.

Themistoclesia campii A. C. Smith, sp. nov.

Frutex ad 1.5 m. altus, ramulis gracilibus subteretibus fusco-cinereis albido-puberulis vel fusco-hispidulis ac etiam squamis parvis irregularibus nigrescentibus leprosis, demum glabratis; petiolis subteretibus 2-3 mm. longis primo minute hispidulis demum glabrescentibus; laminis subcoriaceis in sicco fuscis ovato-ellipticis, 2-3.7 cm. longis, 1-2 cm. latis, basi rotundatis vel subcordatis, ad apicem breviter acuminatum callosum gradatim angustatis, margine leviter incrassatis et recurvatis, supra pallide puberulis mox glabratis, subtus squamis parvis nigris leprosis etiam praecipue costa parce fusco-hispidulis, costa supra leviter impressa subtus valde elevata, nervis lateralibus utrinsecus plerumque 2 e basi orientibus supra leviter impressis vel utrinque ut rete venularum immersis; inflorescentia axillari breviter racemosa 3-10-flora bracteis pluribus papyraceis ovatis subacutis 1-2 mm. longis basi circumdata, rhachi gracili 5-10 mm. longa pilis pallidis 0.2-0.3 mm. longis minute hispidula, bracteis sub floribus ut eis basi inflorescentiae; pedicellis gracilibus sub anthesi 7-11 mm. longis ut rhachi hispidulis etiam nigro-leprosis, medium versus bibracteolatis, bracteolis circiter 1.5 mm. longis; calyce sub anthesi circiter 5 mm. longo et apice 4 mm. diametro ut pedicello hispidulo et leproso, tubo circiter 3 mm. longo manifeste 5-angulato, limbo suberecto papyraceo intus glabro quam tubo breviore 5-lobato, lobis late deltoideis cuspidatis circiter 1 mm. longis, sinibus obtusis; disco annulari-pulvinato hispidulo; corolla carnosa subcylindrica sub anthesi 7.5-8 mm. longa, basim versus 3.5-4 mm. diametro superne angustata, extus pilis stramineis circiter 0.5 mm. longis hispidula, lobis 5 deltoideis subacutis 1-1.5 mm. longis; staminibus 10 similibus quam corolla brevioribus, filamentis liberis gracilibus pallidis ligulatis circiter 2 mm. longis pilis paucis circiter 0.5 mm. longis hispidulis, antheris 4.5-5.5 mm. longis, thecis 1.5-2 mm. longis basi subacutis, tubulis quam thecis longioribus per rimas circiter 1 mm. longas dehiscentibus; stylo tereti corollam subaequante, stigmate minuto.

Azuay: "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 11,000-11,350 ft. elev., Dec. 17, 1944, *Camp E-1640* (TYPE US 1.989,027; dupl. NY) (east of El Pan; shrub 0.5 m. high, terrestrial; leaves deep green above, pale

beneath; hypanthium green; corolla salmon-pink in bud, becoming red at anthesis). Same locality, *Camp E-4865* (NY only) (shrub to 1.5 m.; leaves crisp-coriaceous, deep green, nitid above, pale beneath, cusped, even the youngest with a black scurf; corolla dull crimson, the lobes yellow).

Themistoclesia campii is most readily characterized by the blackish scurfy scales which persist on the lower surfaces of leaves and on the inflorescence, and by its hispidulous corolla. From the Colombian *T. compacta* A. C. Smith it is distinguished not only by the different character of its foliar indument, but also by the shorter and sparser pubescence of its inflorescence (especially the corolla), its longer pedicels, and its isomorphic stamens with essentially glabrous filaments. From *T. dependens* (Benth.) A. C. Smith the new species is readily distinguished by its indument and its short stamens.

Not included in the above description, but almost certainly referable to this species, is *Camp E-751* (NY only) (Azuay: same locality, 9,000–11,000 ft. elev.; spreading shrub with deep red flowers), which differs only as follows: corolla at anthesis 10–11 mm. long and hispidulous only at apex; filaments about 2.5 mm. long, glabrous; anthers about 7 mm. long, the thecae about 2.5 mm. long. Except for the slightly larger and essentially glabrous corolla and stamens, this specimen agrees perfectly with the two described; it apparently represents a form of the species occurring at somewhat lower elevation. When the full range of variability is known, no. *751* will doubtless fit into a reasonable species concept.

Themistoclesia dependens (Benth.) A. C. Smith, Contr. U. S. Nat. Herb. 28: 442. 1932.

Azuay: "Oriente" Border, Eastern Cordillera. between Oña and the Río Yacuambi, east slope, 8,000–9,500 ft. elev., *F. Prieto P-270* (shrub to 3 m.; young leaves pale, the old leaves of previous season deep green and subnitid above, pale green and dull beneath; corolla bright crimson, with pale pink lobes).

A fairly frequent species in western Colombia and Ecuador, also represented from Azuay by *Steyermark 53446 (A, Ch).*

Sphyrospermum buxifolium Poepp. & Endl. Nov. Gen. & Sp. 1: 4. *pl.* 8. 1835.

Guayas, Cañar, Chimborazo, & Bolivar junction: Foothills of the western cordillera near the village of Bucay, *Camp E-3833* (NY only). El Oro: In Moro-Moro region, about 21 miles west of Portovelo, *Camp E-632, E-634* (both NY only). Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, near El Topo, *Camp E-1686, E-1688* (NY only), *E-1689, E-1691* (NY only); same general region, east of Puyo, *Camp E-1698* (NY only). Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza, El Partidero, between the Ríos Paute and Negro, *Camp E-1520* (NY only). Low hills west of Río Upano, along Río Chupiangas, *F. Prieto ChuP-18.* Cordillera Cutucú, *Camp E-1181, E-1202, E-1341, E-1361* (all NY only).

Field notes accompanying this excellent suite of specimens indicate that the plant is a slender epiphyte, often pendant and high-climbing, rarely scrambling or trailing along banks, and in one case (no. *634*) terrestrial and suberect to 50 cm. high; it occurs in forest at elevations of 2,100 to 5,900 ft.; the corolla is white and sometimes pink-tinged; the mature fruit is light blue or pale bluish lavender, sometimes subtranslucent, and insipid.

The related *S. majus* Griseb. was mentioned in my revision (Brittonia 1: 209. 1933) as having a southern limit of Venezuela, but I have since seen several specimens from Colombian Departments as far south as El Valle and Cundinamarca. However, at least in its typical form, the species does not seem to occur in Ecuador, although some of the cited specimens (e. g. those from the Cordillera

Cutucú) approach it in their comparatively large ovate leaves. The value of *S. majus* as a specific entity at any rate is open to question, and I think it advisable to refer all the small-leaved Ecuadorian specimens with 4 or 5 stamens to *S. buxifolium.*

Sphyrospermum flaviflorum A. C. Smith, sp. nov.

Frutex epiphyticus, ramulis gracilibus teretibus cinereis ad nodos incrassatis juventute albido-puberulis mox glabratis; foliis congestis, petiolis subteretibus 1–2 mm. longis ut ramulis mox glabratis; laminis in sicco coriaceis fusco-olivaceis ellipticis, 15–22 mm. longis, 10–15 mm. latis, basi et apice rotundatis, margine incrassatis paullo recurvatis, subtus minutissime et subpersistenter albido-puberulis ac etiam dispersim glanduloso-strigillosis (pilis castaneis circiter 0.2 mm. longis caducis), e basi obscure 3- vel 5-nerviis, costa supra leviter impressa subtus elevata, nervis lateralibus obscuris; floribus axillaribus solitariis basi bracteis pluribus minutis imbricatis suffultis, rhachi subnulla; pedicellis gracilibus 2.5–3.5 mm. longis pilis 0.3–0.6 mm. longis albido-hispidulis basi minute bibracteolatis cum calyce continuis; calyce sub anthesi 3.5–4 mm. longo et apice diametro ut pedicellis hispidulo, tubo cupuliformi circiter 2 mm. longo, limbo erecto-patente profunde 5-lobato, lobis elongato-deltoideis circiter 1.5 mm. longis acutis intus glabris, sinibus obtusis vel rotundatis; disco annulari-pulvinato glabro; corolla subcarnosa extus parce hispidula campanulata, sub anthesi circiter 5.5 mm. longa et apice 4 mm. diametro, lobis 5 late deltoideis circiter 0.5 mm. longis subacutis; staminibus 10 alternatim leviter inaequalibus quam corolla brevioribus, filamentis gracilibus ligulatis glabris circiter 1.5 mm. longis, antheris 2.7–3 mm. longis, thecis 1–1.2 mm. longis, tubulis longioribus per poros subterminales circiter 0.2 mm. longos dehiscentibus; stylo filiformi corollam subaequante, stigmate minuto.

Cañar: Valley of Río de Cañar, near Rosario, 3,400 ft. elev., Sept. 6–10, 1944, *F. Prieto CP-16* (TYPE US 1,988,906; dupl. NY) (epiphyte; leaves succulent; corolla yellowish, tinged with pink if exposed to sun).

Sphyrospermum flaviflorum belongs to a small group of Ecuadorian species not discussed in my revision of 1933, but treated in Sleumer's more recent key (Bot. Jahrb. 71: 394, 395. 1941). The two species thus far comprising the group are characterized by having stamens twice as many as corolla-lobes, very short pedicels, small flowers, and anthers with slender tubules dehiscing by subterminal pores. The new species differs from *S. spruceanum* Sleumer in its larger and obscurely pilose leaves and its obviously pedicellate flowers, which are larger in all parts. From the related *S. microphyllum* Sleumer, it is distinguished by its much larger leaves and flowers, its comparatively conspicuous calyx-lobes, and its campanulate (rather than apically contracted) corollas.

Sphyrospermum campii A. C. Smith, sp. nov.

Frutex epiphyticus vel terrestris, ramulis gracillimis brunneis minute et subpersistenter pallido-puberulis; petiolis gracilibus teretibus 1–2 mm. longis ut ramulis puberulis; laminis in sicco subcoriaceis fuscis ovatis, 15–26 mm. longis, 10–15 mm. latis, basi late obtusis vel subrotundatis, apice subacutis, margine leviter recurvatis, subtus evanescenter puberulis ac etiam dispersim glanduloso-strigillosis, e basi obscure 3- vel 5-nerviis, costa supra plana vel paullo impressa subtus subelevata, nervis aliis immersis; floribus axillaribus solitariis; pedicellis gracilibus sub anthesi 1.5–2 mm. longis parce puberulis cum calyce continuis basi bracteis paucis minutis suffultis, basim versus bibracteolatis, bracteolis reniformi-orbiculatis haud 1 mm. latis; calyce sub anthesi circiter 3 mm. longo et apice diametro pilis pallidis 0.3–0.5 mm. longis copiose hispidulo etiam obscure castaneo-glanduloso, tubo subgloboso circiter 1.5 mm. longo, limbo papyraceo suberecto

4-lobato intus glabro, lobis late deltoideis 0.5–1 mm. longis subacutis, sinibus rotundatis vel late obtusis; disco annulari-pulvinato glabro; corolla subcarnosa late campanulata sub anthesi 8–9.5 mm. longa, basi angustata, apice circiter 6 mm. diametro, glabra, lobis 4 deltoideis subacutis circiter 1.5 mm. longis et 3–4 mm. latis; staminibus 8 similibus quam corolla brevioribus, filamentis ligulatis 2–2.5 mm. longis superne copiose pallido-hispidulis, antheris 3.5–3.8 mm. longis, thecis crassis basi obtusis longitudine tubulos aequantibus, tubulis gracilibus per poros subterminales dehiscentibus; stylo filiformi quam corolla breviore, stigmate truncato.

El Oro: In Moro-Moro region, about 21 miles west of Portovelo, 3,400–4,200 ft. elev., Oct. 7, 1944, *Camp E-633* (TYPE US 1,988,987; dupl. NY) (in dense rain-forest, seen both as epiphyte and on soil on steep banks; when on banks, the flowering branches ascending to 10–15 cm.; corolla deep red; fruit angled, greenish white, translucent when mature, 0.75–1 cm. in diameter).

The species here described seems best placed as a relative of the three species discussed immediately above, differing from all of them in its ovate and subacute leaf-blades and large corollas. In leaf-size it most closely approximates *S. flaviflorum*, described above, but the 4-merous flowers, comparatively small calyx-lobes, glabrous corollas, and differently proportioned anthers further distinguish it.

The mention in Dr. Camp's field notes of an angled fruit may suggest that the new species would be better placed in *Themistoclesia*, in which it bears a superficial resemblance to *T. cuatrecasasii* A. C. Sm. However, the calyx-tube in flower appears essentially globose, as in *Sphyrospermum*, and the habit of the plant certainly suggests this genus. The campanulate corollas and nearly terminal anther-pores are known to occur in *Sphyrospermum*, but not in *Themistoclesia*. A close approach of the two genera, however, is here indicated.

Sphyrospermum cordifolium Benth. Pl. Hartw. 222. 1846.

Pichincha: Along the road from Quito to Sto. Domingo de los Colorados, *Camp E-1734*. Azuay: The eastern Cordillera, vicinity of the village of Sevilla de Oro and 1-8 km. northward, *Camp E-4442* (NY only), *E-4560, E-4740, s. n.* (July-Sept. 1945) (NY only). El Oro: In Moro-Moro region, about 21 miles west of Portovelo, *Camp E-631* (NY only). Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, *Camp E-77*. Hda. Anganuma, at headwaters of Río Cachiyacu, on west slopes of Cordillera Condor, about 46 km. south of Loja, *Jorgensen & Prieto PJ-50B* (NY only). Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza, region of Tambo Consuelo, *Camp E-1602* (NY only).

The cited specimens were collected at elevations of 3,400 to 10,000 ft.; the plant is usually an epiphytic vine, but sometimes terrestrial with branches hanging over rocks; leaves crisp-coriaceous, deep green above and paler beneath; corolla white to pinkish or crimson (in plants not otherwise distinguishable); fruit pale blue, translucent.

These collections are fairly diverse, but I expect that the range of variation which I previously indicated (Brittonia 1: 213, 214. 1933) is not exceeded; degree of floral pubescence and size of corolla seem to be unstable in this species, and flower-color also seems unreliable. The most extreme of the cited specimens is no. *1734*, which perhaps ought to be excluded from the species; it is a shrub 1 m. high, with very short (5–7 mm.) pedicels and small, essentially glabrous flowers. Such short pedicels are found in *S. sodiroi* (Hoer.) A. C. Smith, also from the Province of Pichincha, but in that species the flowers are densely villose, with comparatively large corollas and long filaments. *Sphyrospermum sodiroi* is recorded (*Haught 3228a*, US) as abundant along the Quito-Santo Domingo road, the precise locality of Camp's no. *1734*, indicating the possibility that the two species hybridize in this region, if, indeed, *S. sodiroi* is more than a very extreme form of *S. cordifolium*.

Sphyrospermum sp.

Santiago-Zamora: Valley of the Río Zamora, east of Loja, near Zamora, about 3,000 ft. elev., *Camp E-16* (epiphyte, over river; fruit pale blue).

This fruiting specimen represents a species not otherwise in Dr. Camp's material. In the texture and general shape of its leaves it suggests the Peruvian *S. weberbaueri* (Hoer.) A. C. Smith, but it differs in the leaf-blades with rounded-obtuse apices and in the short-pedicellate fruits. I think it probable that the specimen represents an undescribed species.

Eleutherostemon Herzog.

A note on this little genus and a discussion of the eight species now known to compose it have recently been published by the writer (Contr. U. S. Nat. Herb. 29: 350-355. 1950). Collections of *Eleutherostemon* are still rare, and consequently the eight numbers of it obtained by Dr. Camp are very welcome. The only previous records of the genus in Ecuador refer to *E. amplectens* (Sleumer) A. C. Smith and *E. octandrum* (Sleumer) A. C. Smith (as *Diogenesia octandra* Sleumer, Bot. Jahrb. 71: 396. 1941), and it is possible that the latter record is referable to one of the species I describe below as new. *Eleutherostemon amplectens* is not among Dr. Camp's collections, all of which, in my opinion, represent undescribed species.

Eleutherostemon floribundum A. C. Smith, sp. nov.

Frutex interdum epiphyticus multiramosus, ramulis fusco-cinereis obtuse angulatis juventute minute puberulis mox glabratis; stipulis inconspicuis circiter 1 mm. longis basi pulvinatis acutis; petiolis semiteretibus 1.5-3 mm. longis supra subpuberulis; laminis papyraceis in sicco fuscis lanceolatis, 5-10 cm. longis, 1.3-3 cm. latis, basi acutis vel obtusis, in apicem gracilem ad 15 mm. longum mucronulatum gradatim angustatis, margine leviter recurvatis, supra glabris, subtus minute et dispersim glanduloso-strigillosis vel eglandulosis, costa supra insculpta subtus valde elevata, nervis secundariis utrinsecus plerumque 2 adscendentibus inconspicuis subtus leviter prominulis, rete venularum immerso vel subtus haud prominulo; inflorescentia axillari breviter racemosa 4–8-flora bracteis numerosis ovatis acutis 1–2 mm. longis basi circumdata, rhachi gracili 3–5 mm. longa minute puberula mox glabrata, bracteis floriferis eis basi rhachis similibus caducis; pedicellis gracilibus sub anthesi et fructu juvenili 9–13 mm. longis ut rhachi minute puberulis et superne parce glandulosis medium versus bibracteolatis, bracteolis lanceolatis 1-1.5 mm. longis caducis; calyce cupuliformi sub anthesi 2.5–3 mm. longo et diametro obscure puberulo glabrato, limbo subcoriaceo erecto minute 4-denticulato (dentibus haud 0.3 mm. longis), sinibus complanatis; disco conspicuo carnoso cylindrico circiter 0.7 mm. alto glabro; corolla tenuiter carnosa cylindrico-subcampanulata, sub anthesi 5–6 mm. longa glabra conspicue 4-lobata, lobis elongato-deltoideis circiter 2 mm. longis et 1.5 mm. latis acutis reflexis distaliter intus obscure papillosis; staminibus 5 corollam subaequantibus, filamentis ligulatis liberis 3-3.5 mm. longis ubique copiose breviter pilosis, antheris circiter 3 mm. longis basi obtusis, thecis quam tubulis per rimas 0.6-0.8 mm. longas dehiscentibus paullo longioribus; stylo crasso tereti leviter exserto basi disco arcte cincto, stigmate minuto; fructibus immaturis ellipsoideis leviter quadrangulatis calycis limbo et disco persistentibus coronatis.

Azuay: "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 9,000-11,000 ft. elev., Oct. 30, 1944, *Camp E-706* (TYPE US 1,988,992; dupl. NY) (shrub 1.5 m.; flowers white). Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Hda. Chontal and Sta. Elena, 3,400-4,600 ft. elev., *Camp E-792* (epiphytic shrub to 3 m.); same locality, between Tambo Chontal and Tambo Consuelo, 5,700-8,000 ft. elev., *Camp E-1572* (much-branched epiphyte, in clumps; leaves dark above, paler beneath, shining; fruit globular, pale).

In foliage and in calycine characters *E. floribundum* suggests *E. octandrum* (Sleumer) A. C. Smith, from which it differs in its more compact and fewer-flowered inflorescences, conspicuous cylindric disk (scarcely 0.2 mm. high in *E. octandrum*), slightly shorter corolla, and reduced number of stamens, with longer and copiously pilose filaments. From *E. tetrandrum* A. C. Smith, which similarly has a reduced number of stamens and a conspicuous disk, the new species differs in its proportionately narrower leaf-blades, its inflorescence with a shorter rachis but longer pedicels, shorter and more deeply lobed corolla, and stamens with shorter filaments and longer anthers. So far as observed at present, the stamens are uniformly 4 in *E. tetrandrum* and 5 in *E. floribundum.*

Eleutherostemon oliganthum A. C. Smith, sp. nov.

Frutex interdum epiphyticus, ramulis gracilibus obtuse angulatis juventute minute puberulis mox glabratis; stipulis obscuris pulvinatis; petiolis subteretibus rugulosis 1-2 mm. longis obscure puberulis glabrescentibus; laminis papyraceis in sicco fuscis ovato-lanceolatis, (4-)5-12 cm. longis, (1.5-)1.8-4 cm. latis, basi late obtusis vel rotundatis vel inconspicue subcordatis, in acuminem ad 2 cm. longum (apice ipso obtuso) angustatis, margine anguste recurvatis, utrinque glabris (juvenilibus basim versus puberulis) vel subtus dispersim et sparsissime glanduloso-strigillosis, costa superne impressa subtus elevata, nervis secundariis utrinsecus 2 vel 3 basim versus orientibus (intimis cum costa ad 2 cm. concurrentibus) adscendentibus supra insculptis vel prominulis subtus paullo elevatis, rete venularum supra subplano subtus prominulo; floribus axillaribus solitariis, bracteis basalibus minutis; pedicellis gracillimis parce puberulis sub anthesi 10-13 mm. longis basim versus minute bibracteolatis; calyce sub anthesi 2.5-3.5 mm. longo et 2-3 mm. diametro pilis pallidis circiter 0.2 mm. longis copiose hispidulo ac etiam obscure rubro-glanduloso demum subglabrescente, tubo cupuliformi 1.5-2 mm. longo, limbo subpatente quam tubo leviter breviore minute 5-dentato (dentibus circiter 0.5 mm. longis), sinibus rotundatis; disco carnoso annulari-pulvinato glabro; corolla tenuiter carnosa cylindrica sub anthesi 10-11 mm. longa et circiter 3.5 mm. diametro glabra, lobis 5 deltoideis obtusis haud 1 mm. longis; staminibus 10 quam corolla paullo brevioribus, filamentis gracilibus ligulatis 5-6 mm. longis superne parce hispidulis, antheris 3.5-4 mm. longis, thecis 1.2-1.4 mm. longis basi rotundatis vel obscure mucronulatis, tubulis quam thecis longioribus per rimas elongatas dehiscentibus; stylo leviter exserto filiformi, stigmate minute peltato.

Santiago-Zamora: Cordillera Cutucú, along narrow flood-plain of Río Itzintza, 3,500-3,700 ft. elev., Nov. 17-Dec. 5, 1944, *Camp E-1230* (TYPE NY) (epiphytic; leaves shining; corolla crimson); ridge ascending into central Cutucú, 4,400-4,700 ft. elev., *Camp E-1158* (NY only) (shrub; leaves shining beneath; corolla red); on banks of Río Itzintza, 3,500 ft. elev., *Camp E-1205* (NY only) (epiphyte, flowering on old wood among the roots; leaves deep green and dull above, pale and shining beneath; corolla bright crimson).

Eleutherostemon oliganthum is characterized by its solitary flowers and elongate filaments, being readily distinguished from *E. octandrum* (Sleumer) A. C. Smith, apparently its closest relative, by these characters and by its pilose calyx, longer corolla, and more numerous stamens.

The following specimen probably also belongs here: Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, on cliff-top, near El Topo, 4,400 ft. elev., *Camp E-1687* (plants scrambling from mossy bank, or sometimes epiphytic; fruit solitary, immature, subglobose, about 8 mm. in diameter). It agrees with *E. oliganthum* in length of pedicel, pubescence of calyx, and the comparatively inconspicuous disk; however, its leaves are slightly different in shape and venation, and I hesitate to make a positive identification of it without flowers.

Eleutherostemon gracilipes A. C. Smith, sp. nov.

Frutex praeter flores ubique glaber, ramulis gracilibus obtuse angulatis; stipulis obscuris coriaceis pulvinatis haud 1 mm. longis; petiolis subteretibus rugulosis 1-2 mm. longis; laminis papyraceis in sicco fuscis lanceolatis vel ovato-lanceolatis, 7-11 cm. longis, 1.5-5 cm. latis, basi late obtusis vel rotundatis, in acuminem gracilem obtusum ad 2 cm. longum gradatim angustatis, margine paullo recurvatis, subtus minute et dispersim glanduloso-strigillosis, basim versus 5-nerviis, costa et nervis secundariis (intimis cum costa ad 2 cm. concurrentibus) adscendentibus supra leviter impressis subtus elevatis, rete venularum supra plerumque immerso subtus prominulo; floribus axillaribus ut videtur solitariis, bracteis basalibus paucis obscuris; pedicellis gracillimis sub anthesi 20-30 mm. longis minute albido-puberulis basim versus minute bibracteolatis superne obscure glandulosis; calyce sub anthesi 4.5-5 mm. longo et apice diametro albido-puberulo, tubo cupuliformi 2.5-3 mm. longo basim versus obscure rubro-glanduloso, limbo erecto-patente submembranaceo circiter 2 mm. longo minute 5-dentato (dentibus apiculatis circiter 0.5 mm. longis), sinibus complanatis; disco annulari-pulvinato carnoso glabro; corolla tenuiter carnosa glabra anguste cylindrico-campanulata sub anthesi 20-22 mm. longa, basim versus circiter 4 mm. superne 7-8 mm. diametro, lobis 5 reflexis obtusis circiter 4 × 3 mm.; staminibus 10 longitudine corollam fere aequantibus, filamentis liberis membranaceis ligulatis circiter 13 mm. longis utrinque villoso-puberulis (pilis circiter 0.3 mm. longis), antheris 7-7.5 mm. longis, thecis levibus circiter 2.5 mm. longis basi rotundatis, tubulis 5-5.5 mm. longis per rimas ovales 1-1.5 mm. longas dehiscentibus; stylo filiformi corollam subaequante, stigmate minuto.

Santiago-Zamora: Eastern slopes of the cordillera, valley of the Río Negro, junction of Ríos Pailas and Negro (on the trail to Mendez), 6,000-7,500 ft. elev., Aug. 20-24, 1945, *Camp E-4924* (coll. *F. Prieto*) (TYPE US 1,989,113; dupl. NY) (shrub 3 m.; leaves deep green above, bright green and subnitid beneath).

Eleutherostemon gracilipes is immediately distinguished from its congeners by its comparatively long pedicels and corollas and its greatly elongated filaments. In its solitary flowers and puberulent calyx it suggests the preceding new species (*E. oliganthum*), but in floral dimensions the two are very distinct.

Disterigma alaternoides (H. B. K.) Nied. Bot. Jahrb. **11**: 224. 1889.

Cañar: Northeast of Azogues, *Camp E-1784, F. Prieto P-90.* Azuay: Ridge between El Pan and Guachapala, *Camp E-5256.* North of Paute, *Camp E-2594.* The eastern Cordillera, north of Sevilla de Oro, *Camp E-4271.* "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), *Camp E-720.* Loja: Loma de Oro, near Saraguro, *Camp E-558* (NY only), *E-692.* Nudo de Guagrauma, slopes of the Loma de Oro, *Camp E-274* (NY only). Cerro Villanaco, west of Loja, *Camp E-249, E-250.* "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, *Camp E-74, E-90.* Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, vicinity of El Topo, *Camp E-1684, E-1685, E-1690* (NY only), *E-2410* (NY only). Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza, Tambo Chontal to Tambo Consuelo, *Camp E-1595* (NY only).

The cited specimens were obtained at altitudes of 4,000 to 11,000 ft., the plant having been noted most often as a shrub, low and spreading in exposed places but up to 4 m. high where protected from winds; it is sometimes epiphytic, either dependent or with erect stiff branches; leaves deep green above, paler beneath, often nitid; corolla white to pink; mature fruit about 1 cm. in diameter, white or pinkish to reddish purple or wine-red, translucent.

This excellent series of specimens, together with many others which have become available since my previous discussion of the species (Brittonia 1: 219, 220. 1933), show that *D. alaternoides* varies to such a degree that the variety *parvifolium* (Benth.) A. C. Smith no longer has any significance. This variety occurs throughout the range of the species (Venezuela to Bolivia) and is distinguishable only on the basis of its smaller than typical leaves. It is now seen that leaves on different branches of the same plant are often quite diverse in size, their dimensions perhaps depending largely upon age or exposure. Although I originally noted the flowers as "glabrous," it should be noted that some of the specimens now available have both calyx and corolla sparsely pilose with minute whitish hairs.

Disterigma leucanthum A. C. Smith, sp. nov.

Frutex epiphyticus vel muscicola, ramulis gracilibus obtuse angulatis juventute minute puberulis demum glabratis; petiolis subteretibus rugulosis 1.5–2.5 mm. longis ut ramulis puberulis; laminis subcoriaceis in sicco fusco-viridibus ellipticis, 15–22 mm. longis, 8–15 mm. latis, basi rotundatis vel late obtusis, apice late obtusis, margine leviter recurvatis, juvenilibus parce puberulis mox glabratis, subtus parce et subpersistenter rubro-glanduloso-strigillosis, e basi obscure 5-nerviis, costa et nervis secundariis supra prominulis subtus obscuris vel leviter elevatis, rete venularum supra saepe prominulo subtus immerso; inflorescentia uniflora bracteis inconspicuis pluribus papyraceis imbricatis suborbiculari-oblongis parce ciliolatis (maximis circiter 1.5 mm. longis) basi circumdata; pedicellis bracteolis calyce et corolla extus dense et uniformiter puberulis (pilis pallidis patentibus circiter 0.1 mm. longis); pedicellis teretibus 1–2 mm. longis, bracteolis apicalibus late ovato-reniformibus circiter 1 mm. longis et 3 mm. latis ciliolato-marginatis imbricatis quam calycis tubo brevioribus; calyce sub anthesi circiter 5 mm. longo et apice diametro, tubo obscure angulato circiter 1.5 mm. longo, limbo erecto-patente profunde 4-lobato, lobis ovatis 2.5–3 mm. longis latisque interdum basi anguste imbricatis apice obtusis intus glabris; disco annulari-pulvinato glabro; corolla carnosa cylindrica sub anthesi circiter 9 mm. longa et 3.5 mm. diametro intus glabra, lobis 4 oblongis circiter 2 mm. longis obtusis; staminibus 8 quam corolla brevioribus, filamentis gracilibus liberis ligulatis 2–2.5 mm. longis superne intus parce villosis, antheris 4.5–5 mm. longis, thecis basi rotundatis parce hispidulis, tubulis thecas longitudine subaequantibus per rimas ovales 0.5–1 mm. longas dehiscentibus; stylo crasso tereti corollam subaequante, stigmate minuto.

Santiago-Zamora: Cordillera Cutucú, ridge just south and west of Río Itzintza, 5,000–5,900 ft. elev., Nov. 17–Dec. 5, 1944, *Camp E-1344* (TYPE US 1,989,017; dupl. NY) (epiphyte, or at 5,900 ft. seen growing in a mound of sphagnum; corolla pure white).

The new species is a relative of *D. alaternoides* (H. B. K.) Nied., differing in its very short pedicellary bracteoles which do not effectively conceal the calyx-tube (as they do in *D. alaternoides*, where they are usually 2–4 mm. long), its copiously and uniformly puberulent flowers (glabrous or very sparsely pilose in *D. alaternoides*), its large calyx-lobes (1–2 mm. long in *D. alaternoides*), and its longer corolla and anthers. Other species of this general alliance, *D. popenoei* Blake and *D. ulei* Sleumer, differ from the new species in many obvious characters, the first having conspicuously nerved leaves, several-flowered inflorescences, a glabrous short-lobed calyx, and small anthers, the second having thick-carnose obovate leaves and very small flowers (calyx teeth minute; corolla about 3.5 mm. long, glabrous; anthers about 2 mm. long).

Disterigma empetrifolium (H. B. K.) Drude in E.& P. Nat. Pfl. 4 (1): 52. 1889.

Cañar: Uplands called "Huairacaja," 10 20 km. northeast of Azogues, *Camp E-1777*. Azuay: Along the Río Matadero, west of Cuenca, *Camp E-2021*. Vicinity of the lake in the valley of the Río Surucuchu (a branch of the Río Matadero), 18–20 km. west of Cuenca, *Camp E-4162*. Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, *Camp E-467*. "Oriente" Border, Eastern Cordillera, between Oña and the Río Yacuambi, *F. Prieto P-303*. Loja: Cerro Villanaco, about 7 km. west of the city of Loja, *Camp E-247*.

The species was often common where noted, at elevations of 8,000 to 11,200 ft., growing as a low shrub in grass, among rocks, on banks, or in bogs, often forming mats or dense clumps and propagating by runners; leaves dark green above, paler beneath, dull on both sides or shining above; corolla light rose or deep pink to crimson; filaments white, the anthers red-brown; mature fruit white, translucent, oblate-spherical, up to 1 cm. in diameter, insipid.

This is the common small-leaved species of *Disterigma*, occurring along the Andes from Venezuela to Peru.

Disterigma codonanthum Blake, Jour. Wash. Acad. **16**: 363. 1926.

Azuay: Cordillera de Alpachaca (headwaters of the Río Jubones, between the Ríos Giron and León), near the pan-American highway at about km. 79, *Camp E-405*. The eastern Cordillera, 4 6 km. north of the village of Sevilla de Oro, *Camp E-4717A, E-4717B*. "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), *Camp E-4869* (NY only); same locality, east of El Pan, *Camp E-1632*.

The cited specimens were obtained at elevations of 9,000 to 11,350 ft.; they were collected at the edges of páramos and sometimes formed the dominant groundcover on open slopes and páramo areas; in habit these plants often occur in dense mats in sphagnum meadows, propagating by long runners, sometimes almost buried in the sphagnum with only the tips exposed, or with the aerial parts stiffly erect and rarely as high as 0.5 m.; leaves shining, deep green above, paler beneath; bracts and calyx bright green; corolla green, red-tinged, brick-red, or rosy-pink (total range of color variation from green to red sometimes found in single plants); filaments white to bright pink, the anthers brown; fruit white, translucent.

This species, apparently endemic to Ecuador, is less rare than indicated by the fact that I cited only two collections in 1933 (Brittonia 1: 228); I have since seen material from Carchi (*Penland & Summers 871*, NY), Imbabura (*Penland & Summers 818*, NY), and Azuay (*Steyermark 53436*, A, Ch). Some of the corollas on the Camp specimens are larger than previously noted, being up to 10 mm. long. Number *4869* has leaf-blades notably larger than usual (up to 10 × 5 mm.), but its flowers are typical for the species. Number *1632*, from the same general locality, has one similarly large-leaved branch, from which arise lateral shoots with leaves normal for the species (1.5–3 mm. broad). These interesting specimens show what variable and undependable characters the shape and size of leaves are in this complex.

Disterigma campii A. C. Smith, sp. nov.

Frutex epiphyticus, ramulis elongatis gracilibus fusco-castaneis obtuse angulatis vel subteretibus copiose hispidulis (pilis castaneis circiter 1 mm. longis subpersistentibus); foliis non confertis 4 vel 5 per centimetrum; petiolis teretibus

gracilibus circiter 1 mm. longis parce breviter hispidulis; laminis papyraceis in sicco supra olivaceis subtus fuscis oblongo-ellipticis, (10-)12-15 mm. longis, (3-)5-8 mm. latis, basi obtuse cuneatis, apice obtusis vel rotundatis, margine recurvatis, utrinque glabris vel subtus raro obscure glandulosis secus costam, e basi obscure 5-nerviis, costa supra leviter impressa subtus elevata, nervis aliis immersis; floribus solitariis axillaribus subsessilibus praeter calycis lobos et filamentas glabris, bracteis basalibus paucis papyraceis suborbicularibus maximis haud 1.5 mm. diametro; pedicellis gracilibus circiter 0.5 mm. longis, bracteolis apicalibus papyraceis suborbicularibus 3-3.5 mm. longis et latis rotundatis calycis tubum amplectentibus; calyce sub anthesi circiter 5 mm. longo et apice diametro, tubo cupuliformi circiter 2 mm. longo, limbo erecto-patente papyraceo profunde 4-lobato, lobis oblongo-deltoideis 2.5-3 mm. longis 2-2.5 mm. latis apice incrassatis subacutis minute hispidulis; disco annulari-pulvinato; corolla tenuiter carnosa late campanulata etiam subrotata 5-6 mm. longa apice 7-8 mm. diametro profunde 4-lobata, lobis deltoideis 3.5-4 mm. longis et basi circiter 3 mm. latis valde reflexis apice obtusis; staminibus 8 quam corolla brevioribus, filamentis ligulatis gracilibus liberis circiter 1.5 mm. longis superne parce hispidulis, antheris 3-3.5 mm. longis, thecis basi rotundatis, tubulis gracilibus quam thecis brevioribus per rimas ovales circiter 0.5 mm. longas dehiscentibus; stylo crasso tereti leviter exserto, stigmate minuto.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, near junction of El Tigre and Pastaza, below Topo, 5,600 ft. elev., May 9, 1944, *Camp E-1692* (TYPE US 1,989,039; dupl. NY) (epiphyte, blown from tree-top; terminal new growth in bud notably mucilaginous; flowers white; fruit white, translucent).

The very distinct new species here described is characterized by its lax habit, elongate branchlets with a persistent hispidulous indument, well-spaced leaves of average size for the genus, solitary subsessile flowers, and especially by its broadly campanulate or even subrotate corollas. In size and shape of leaves it approximates *D. humboldtii* (Kl.) Nied. (Guatemala to Venezuela and Colombia), but that species has shorter calyx-lobes, a cylindric corolla, comparatively long filaments, and anthers with proportionately longer tubules. In floral characters the new species seems closest to *D. codonanthum* Blake, and its leaves (although still considerably larger) are even suggestive of the large-leaved phase of that species, discussed above. However, *D. campii* also differs from *D. codonanthum* in its branchlet-indument, shorter pedicels, shorter and even more broadly campanulate corollas, and short filaments.

Disterigma micranthum A. C. Smith, sp. nov.

Frutex nanus, ramulis primo brunneis obtuse angulatis laxe pilosis (pilis circiter 1 mm. longis) demum cinerascentibus teretibus glabratis, ramulis brevibus bracteis papyraceis imbricatis lanceolato-oblongis (maximis circiter 6 mm. longis) basi circumdatis; foliis non confertis 3 vel 4 per centimetrum; petiolis gracilibus subteretibus circiter 1 mm. longis parce puberulis; laminis papyraceis in sicco pallide olivaceis anguste ellipticis, 8-10 mm. longis, 3-4.5 mm. latis, basi et apice obtusis, margine subplanis, interdum apicem versus obscure puberulis et subtus parce glanduloso-strigillosis, e basi obscure 3- vel 5-nerviis, costa nervisque immersis vel subtus leviter prominulis; floribus solitariis axillaribus subsessilibus praeter filamentas glabris, bracteis basalibus paucis suborbicularibus maximis haud 1 mm. diametro; pedicellis gracilibus haud 1 mm. longis, bracteolis apicalibus papyraceis suborbicularibus 2.5-3 mm. diametro scarioso-marginatis basi imbricatis calycis tubum amplectentibus; calyce sub anthesi 2.5-3 mm. longo et apice diametro, tubo obtuse angulato circiter 1.5 mm. longo, limbo erecto-patente 4-lobato, lobis deltoideis circiter 1 × 1.5 mm. subacutis; disco annulari-pulvinato;

corolla tenuiter carnosa urceolata sub anthesi 3.5–4 mm. longa et 2.5–3 mm. diametro basi et faucibus contracta, lobis 4 oblongis circiter 1 mm. longis subacutis; staminibus 8 quam corolla brevioribus, filamentis gracilibus liberis circiter 2 mm. longis superne villosis (pilis albidis circiter 0.4 mm. longis), antheris circiter 1.4 mm. longis, thecis basi rotundatis, tubulis gracilibus thecas subaequantibus per rimas ovales circiter 0.5 mm. longas dehiscentibus; stylo tereti corollam subaequante, stigmate minuto.

El Oro: In Moro-Moro region, about 21 miles west of Portovelo, 3,400–4,200 ft. elev., Oct. 7, 1944, *Camp E-616* (TYPE NY) (in dense rain-forest, on banks; flowers white).

This new species is without close allies, being characterized by its very small flowers with urceolate corollas. In foliage it may most nearly suggest *D. humboldtii* (Kl.) Nied. and *D. campii* (described above), but the size and shape of the corolla and the minute anthers of *D. micranthum* make detailed comparisons superfluous.

Disterigma sp.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, low hills east of Puyo, 3,000 ft. elev., *Camp E-1699, E-1700* (both NY only) (epiphytes; fruit subtranslucent).

The cited specimens represent another species of *Disterigma* with a lax habit, leaves comparatively spaced on the branchlets, and subsessile solitary flowers. They closely resemble the preceding new species (*D. micranthum*) in foliage, but the calyx-lobes are comparatively elongate (about 2 mm. long) and hispidulous-ciliolate on the margins; the leaves also are persistently ciliolate-margined. Although I feel certain that these two collections represent an undescribed species, in the absence of corollas I think it best to await more complete material.

Disterigma acuminatum (H. B. K.) Nied. Bot. Jahrb. 11: 209. 1889.

Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, *Camp E-1729* (NY only). Azuay: Páramo and subpáramo area north and northwest of the Páramo del Castillo (6–8 km. north-northeast of Sevilla de Oro), *Camp E-5173.* Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), *Camp E-4810.* Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, *Camp E-75, E-96.* Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, Sierra de los Leones, near Baños, *Camp E-1696.*

The above collections come from elevations of 7,000–11,200 ft.; the plant is noted as an epiphyte, with stems pendant to 2 m., or as terrestrial, erect or spreading, up to 3 m. high, often irregularly branched; leaves pale green or deep green above and paler beneath; corolla greenish yellow or white tinged with pink; fruit white, translucent.

Disterigma acuminatum is a well-marked and fairly abundant species, occurring along the Andes from Colombia to Peru. Some of the Ecuadorian specimens, such as *Camp E-1729* and *Sydow 608* (US), from Tungurahua, have leaves larger than normal for the species.

Disterigma pentandrum Blake, Jour. Wash. Acad. 16: 364. 1926.

Chimborazo: Cañon of the Río Chanchan, about 5 km. north of Huigra, *Camp E-3313*; same general locality, directly above the village of Huigra, *Camp E-3480* (NY only). Cañar: Valley of Río de Cañar at "Selem," between Galleturo and Cañar, *F. Prieto CP-40.* Azuay: Nudo de Portete, Pacific side of pass between headwaters of the Ríos Tarqui and Giron, *Camp E-2175.* "Oriente" Border, east slope of Eastern Cordillera, between Oña and the Río Yacuambi, *F. Prieto P-271.*

Santiago-Zamora: Valley of the Río Zamora, east of Loja, ridge across the river from the village of Zamora, *Camp E-34* (NY only).

The cited specimens were collected at elevations of 5,000 to 9,500 ft.; the plants were noted as epiphytes or as shrubs up to 4 m. high growing on cliffsides or hanging from rocks; leaves crisp- or inflated-succulent, 1–2 mm. thick, deep green above, paler beneath, usually shining on both sides or dullish beneath; bracts pale chestnut-brown; calyx light pink to red; corolla crimson; fruit pale blue to deep lavender, the projecting calyx-lobes purplish or nigrescent-purple.

This series of specimens is a valuable addition to the known material of the species, which in 1933 (Brittonia 1: 231) I had known only from the two original collections. Since that time Sleumer (Notizbl. Bot. Gart. Berlin 12: 123. 1934) has cited several additional Ecuadorian specimens and discussed variation within the species, which is considerable but no more than normal in *Disterigma.*

Another specimen of this relationship is: Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, about 6,000 ft. elev., *Camp E-1738* (NY only) (plant hanging down to 0.3 m.; on cliff; flowers solitary in axils, deep rose; leaves subcarnose, red-tinged). This number is certainly allied to *D. pentandrum,* like which it has 5 stamens. However, its calyx-lobes are 1–1.5 mm. long, eciliate, and not thickened (those of the species being usually 2.5–4 mm. long, obviously glandular-ciliate, and distally thickened). I suspect that no. *1738* represents an undescribed species of this alliance, but the material is not adequate for description.

Vaccinium floribundum H. B. K. Nov. Gen. & Sp. 3: 266. *pl. 251.* 1818.

[Colombia: Nariño: Near Chiles, *Camp E-341.*] Carchi: *Camp E-297, E-298, E-313–E-317* incl., *E-333.* Pichincha: *Camp E-1704, E-1714.* Leon: *Camp E-2351.* Cañar: *Camp E-1796.* Azuay: *Camp E-384, E-389, E-463, E-1641, E-2063, E-2140, E-2264, E-5174, E-5243, s. n.; F. Prieto P-236A, P-236B, P-269, P-311.* Loja: *Camp E-95, E-272.*

The specimens cited above, which give an excellent picture of the degree of variation in typical *V. floribundum* in Ecuador, are accompanied by notes too extensive to be given here. In brief, the plant was found at elevations of 7,500 to 12,000 ft.; it was noted as a shrub up to 2 m. (or rarely as much as 3.5 m.) high, often low, spreading, or prostrate on páramos, in small or extensive colonies, with underground burls up to 10 cm. in diameter; leaves deep green above, paler beneath, dull on both sides or subnitid above; hypanthium green to purplish, or suffused with pink, sometimes subglaucous, the calyx-lobes sometimes red; corolla usually bright pink to red, sometimes white tinged with pink; fruit blue to black, glaucous or not.

The varieties of *V. floribundum* accepted by Sleumer (Notizbl. Bot. Gart. Berlin 13: 129–132. 1936) seem of very questionable value, being based on size and shape of leaves. However, I have attempted to arrange the present collections in these varieties. Those cited above fall into the typical variety as interpreted by Sleumer. It may be noted that nos. *389, 2264, 5243,* and *s. n.* represent the form which Blake has described as *V. dasygynum* (which Sleumer reduces outright to typical *V. floribundum*), of which the calyx is pubescent.

Vaccinium floribundum var. **marginatum** (Dun.) Sleumer, Notizbl. Bot. Gart. Berlin 13: 131. 1936.

Cañar: Northeast of Azogues, *F. Prieto P-153.* Azuay: Páramo de Tinajillas and surrounding chaparral and forests, south of Cuenca, *Camp E-485.* Cordillera de Alpachaca, *Camp E-284* (NY only).

The specimens are from elevations of 9,800 to 11,000 ft., and the plant is noted as a spreading or arching shrub to 0.2 m., with a pink corolla and black fruit. This variety, characterized by having its leaf-blades ovate and broadest toward the base, hardly seems worthy of separation from the typical variety; however, our specimens agree well with those from Ecuador cited by Sleumer.

Vaccinium floribundum var. ramosissimum (Dun.) Sleumer, Notizbl. Bot. Gart. Berlin 13: 131. 1936.

Carchi: Páramo del Angel, about 24 km. southwest of Tulcán, 11,500 ft. elev., *Camp E-286, E-290* (NY only). Loja: Cerro Villanaco, about 7 km. west of Loja, 8,000–9,500 ft. elev., *Camp E-210* (NY only).

The specimens are from low shrubs, up to 0.3 m. high, the older ones arising from a characteristic burl; corolla pink; fruit dark blue, subglaucous. The variety *ramosissimum*, characterized by its very small leaves, is perhaps somewhat stronger than var. *marginatum*, but still it appears to be merely an extreme form of the species from exposed locations.

Vaccinium crenatum (Don) Sleumer, Notizbl. Bot. Gart. Berlin 12: 291. 1935.

Azuay: Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, *Camp E-2284*. "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), *Camp E-1643, E-4819*. Ridge between El Pan and Guachapala, *Camp E-5245*. Loja: Cerro Villanaco, about 7 km. west of Loja, *Camp E-165, E-260* (NY only). Nudo de Cajanuma, south of Loja, *Camp E-562* (NY only). Santiago-Zamora: East of El Pan at about Azuay line, near "Laguna," *F. Prieto P-62*.

The cited specimens were obtained at elevations of 7,500 to 11,500 ft.; the plants are usually prostrate and trailing (rarely erect to 1 m. high) on banks, open slopes, and bare eroding areas, often rooting along the stem; leaves often reddish when young, later deep green and shining above, with nerves reddish beneath; corolla pink to bright red or crimson; fruit nigrescent-blue or purple-black, shining.

Venezuela to Peru; our material agrees well with the Ecuadorian specimens cited by Sleumer in Notizbl. Bot. Gart. Berlin 13: 133 (1936).

Semiramisia speciosa (Benth.) Kl. Linnaea 24: 25. 1851.

Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, ca. 10,000 ft. elev., *Camp E-107* (scrambling shrub, growing to 5 m. high, with stems up to 2.5–3 cm. diam.; corolla cylindric, not apically fluted, bright red, the base near calyx yellowish green; calyx green, conspicuously fluted).

The cited collection comes from near the type locality; I have recently (Contr. U. S. Nat. Herb. 29: 359. 1950) cited other Ecuadorian collections of the species.

Semiramisia weberbaueri Hoer. Bot. Jahrb. 42: 310. 1909.

Azuay: "Oriente" Border, Páramo del Castillo and surrounding forested area (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 9,000–11,000 ft. elev., *Camp E-735* (shrub to 2 m., on ground; corolla basally green, apically bright red). Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), 6,500–7,500 ft. elev., *Camp E-756* (shrub 4 m.; corolla basally green, apically crimson).

The differences between this species and the preceding are perhaps not very significant; *S. weberbaueri* has comparatively narrow leaves which are acute to obtuse at base. The difference in the calyx-tube–whether smooth or angled–which I utilized in Contr. U. S. Nat. Herb. 28: 348–349 (1932), appears on the basis of more ample material to be of little consequence, the angles tending to disappear with maturity. The type of *S. weberbaueri* was from the Department of Amazonas, Peru, but other collections from Ecuador have been mentioned by me (op. cit. 350).

Semiramisia hypogaea A. C. Smith, sp. nov.

Frutex repens caespite fere saepe occultus praeter flores ubique glaber, ramulis gracilibus teretibus brunneis inferne radicantibus, internodiis interdum paucibracteatis, bracteis inconspicuis papyraceis lanceolatis circiter 2 mm. longis; petiolis subteretibus valde rugulosis 2–5 mm. longis crassis (1.5–2.5 mm. diametro); laminis crasso-coriaceis in sicco fusco-olivaceis late ovatis, 3.5–7 cm. longis, 2.5–4.6 cm. latis, basi rotundatis vel late cuneatis, apice subacutis raro (minoribus) subrotundatis, margine incrassatis et paullo recurvatis, maturis inconspicue immerso-glandulosis vel sparsissime castaneo-glanduloso-strigillosis (juvenilibus pilis rubris glandulosis 0.2–0.3 mm. longis utrinque strigillosis), costa utrinque leviter elevata, nervis primariis basalibus plerumque utrinsecus 2 curvato-adscendentibus haud elevatis, venulis immersis; floribus paucis in axillis solitariis vel infra folia orientibus ubique (i. e. pedicello, calyce, et corolla) pilis albidis circiter 0.3 mm. longis patentibus indutis, bracteis minutis; pedicellis leviter curvatis sub anthesi 7–8 mm. longis basim versus minute bibracteolatis superne paullo incrassatis et cum calyce continuis; calyce 4.5–5.5 mm. longo apice 4–5 mm. diametro, tubo cupuliformi circiter 3 mm. longo, limbo suberecto 1.5–2.5 mm. longo, lobis 5 deltoideis circiter 1.5 mm. longis et 1.5–2 mm. latis acutis, sinibus subacutis; disco annulari-pulvinato glabro; corolla siccitate fragili cylindrica sub anthesi 20–23 mm. longa 4–5 mm. diametro, lobis 5 oblongo-deltoideis 3.5–4 mm. longis 2–2.5 mm. latis obtusis; staminibus 10 corollam subaequantibus, filamentis ligulatis liberis glabris circiter 3 mm. longis, thecis levibus 5–6 mm. longis basi obtusis in tubulos gracillimos 15–18 mm. longos poris subterminalibus apertos terminantibus; stylo filiformi corollam subaequante, stigmate minuto.

Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, about 10,000 ft. elev., July 2, 1944, *Camp E-88* (TYPE NY; dupl. US) (in pass, the plants spreading by runners, almost hidden in the short grass; young leaves brilliant red, green with age, and dull on both surfaces; flowers noted on old wood or in the axils of last year's leaves, apparently solitary; corolla deep red, hidden in the grass or sometimes below the surface of the turf; when flowers are produced below the surface of the soil the pedicels elongate and bring them to the surface; anthers brilliant yellow; this plant would be easily missed were it not for the bright red of the young leaves).

The remarkable habit described in Dr. Camp's field notes, which indicate that the flowers are sometimes subterranean, has not otherwise been noted in this group. Perhaps, however, the related *S. fragilis* A. C. Smith [including *Ceratostema longepedicellatum* Sleumer; see Bull. Torrey Club 63: 312 (1936) for reduction], also from Ecuador, may have a similar habit. These two species form a very distinct group without close allies in *Semiramisia*. From *S. fragilis* the new species differs in matters of degree which seem worthy of specific recognition; the leaves are considerably larger and predominantly acute at apex, the pedicels are shorter (but perhaps elongating as implied in the field note), the calyx is slightly larger, and the thecae of the anthers longer. Comparable dimensions in *S. fragilis* are: petioles 1.5–2 mm. long; leaf-blades 1.5–3 by 1.1–2.2 cm., rounded or broadly obtuse at apex; pedicels 10–20 mm. long at anthesis, up to 40 mm. in fruit; calyx 3–3.5 mm. long; thecae 2–3 mm. long.

Ceratostema Juss. Gen. Pl. 163. 1789.

Englerodoxa Hoer. Bot. Jahrb. 42: 310. 1909.

Periclesia A. C. Smith, Contr. U. S. Nat. Herb. 28: 357. 1932.

In my treatment of 1932 I recognized the genus *Englerodoxa* as composed of three species; shortly afterward the identity of this concept with *Ceratostema*

(sensu vero, non sensu A. C. Smith, Contr. U. S. Nat. Herb. 28: 335–348. 1932) was pointed out by Sleumer (Notizbl. Bot. Gart. Berlin 12: 278–282. 1935) and myself (Bull. Torrey Club 63: 307–309. 1936). *Periclesia* was established by the writer on the basis of a single species. At that time the distinction between the two genera seemed adequate, *Periclesia* having 4-merous flowers with extremely large calyx-lobes and connate filaments.

Now, however, several additional species have been referred to *Ceratostema* and four additional ones to *Periclesia*. These species serve effectively to break down the differences originally believed to separate the two genera, and the extensive material of this complex assembled by Dr. Camp and his assistants further indicates that the two concepts are no longer useful. With the addition of three novelties herewith described, 16 species of *Ceratostema* (sensu vero) may now be recognized. In order to facilitate identification in this difficult genus I give below a key to the known species.

Ceratostema may be circumscribed as having the following fundamental characters: calyx articulate with pedicel (the articulation rarely obscure or even lacking, in *C. loranthiflorum*); corolla large, often ventricose near base, deeply lobed; filaments free or connate, glabrous or pilose (but never with massed retrorse hairs); stamens with strongly granular thecae and very slender stiff tubules which dehisce by short oblique subterminal pores. It is geographically limited to the Andean area extending from southern Colombia through Ecuador and possibly into northern Peru, the precise locality of some collections being questionable. In the Ecuadorian Andes *Ceratostema* seems to be one of the most frequent and certainly one of the most striking vacciniaceous constituents of the flora.

In reconsidering the genus *Ceratostema* mention should be made of *C. speciosum* André (Illustr. Hort. 17: 52. *pl.* 9. 1870; A. C. Smith, Contr. U. S. Nat. Herb. 28: 345. 1932), which I referred to the genus *Plutarchia* in 1936 (Bull. Torrey Club 63: 312). The type of the species was obtained near Loja (south of the usual range of *Plutarchia*), and from the inadequate original description and plate it seems possible that the species actually does represent *Ceratostema* in the sense of the present treatment. The important character of the anther-dehiscence cannot be ascertained from the original publication; lacking this, I am still unable to place the species with certainty. If it does fall into *Ceratostema* it appears distinct from any of the species in my key below.

KEY TO THE SPECIES OF CERATOSTEMA

Calyx-limb very conspicuous, the lobes elongate-deltoid, at anthesis at least 10 mm. long.

Leaf-blades deeply cordate at base; calyx-lobes membranaceous, conspicuously reticulate-nerved.

Rachis, pedicels, and calyx pilose with whitish eglandular hairs; bracts and bracteoles small; calyx-tube 10-costate; leaf-blades soft-pilose beneath. *C. peruvianum* Gmel.

Rachis, pedicels, and calyx copiously pilose with weak gland-tipped hairs; bracts and bracteoles papyraceous, 5–17 mm. long; calyx-tube terete; leaf-blades essentially glabrous. *C. pensile* A. C. Smith, comb. nov.

Leaf-blades attenuate to obtuse at base.

Calyx-tube obconical, smooth, the lobes membranaceous, conspicuously reticulate-nerved; anthers with thecae 5–6 mm. long; flowers 4-merous; leaf-blades 4–6 × 1.2–1.8 cm. *C. flexuosum* (A. C. Smith) Macbr.

Calyx-tube costate or winged, the lobes chartaceous to coriaceous; anthers with thecae 8–18 mm. long; flowers 5-merous (calyx- and corolla-lobes sometimes partially fused).

Leaf-blades lanceolate-oblong, 5–7 × 1–2 cm., obscurely pinnatinerved, soft-pilose beneath; pedicels, calyx-tube, and corolla densely pale-pilose; calyx-tube winged. *C. lanceolatum* Benth.

Leaf-blades elliptic or ovate-elliptic (rarely lanceolate), 6–12 × 2–8 cm., essentially glabrous, the secondary nerves ascending from or nearly from base; flowers glabrescent at or soon after anthesis.

Calyx 30–45 mm. long, the tube conspicuously 5-winged. *C. reginaldii* A. C. Smith, comb. nov.

Calyx 20–28 cm. long, the tube regularly 10-costate. *C. alberti-smithii* (Sleumer) Sleumer.

Calyx-limb comparatively inconspicuous, the lobes deltoid, ovate, or merely apiculate, not more than 7 mm. long at anthesis.

Sinuses of calyx-limb usually acute or obtuse, the lobes obvious, 1–7 mm. long.

Leaf-blades conspicuously cordate and amplexicaul at base.

Calyx-tube 10-costate; corolla 25–30 mm. long; leaf-blades up to 7.5 × 4.5 cm.; branchlets and young leaves soft-pilose. *C. amplexicaule* A. C. Smith.

Calyx-tube terete; corolla 33–35 mm. long; leaf-blades up to 13.5 × 7 cm.; branchlets and leaves glabrous. *C. silvicola* A. C. Smith.

Leaf-blades acute to rounded or faintly cordate at base, not amplexicaul.

Corolla 15–20 mm. long; calyx continuous with pedicel (or the articulation very obscure); leaf-blades usually lanceolate-elliptic, rarely more than 3.5 cm. broad. *C. loranthiflorum* Benth.

Corolla at least 35 mm. long; calyx obviously articulate with pedicel.

Leaf-blades 6–12 cm. long, the principal nerves sharply ascending from or nearly from base.

Calyx-tube longitudinally furrowed, the lobes about 6 mm. long; corolla about 6 mm. in diameter near base; filaments about 3 mm. long. *C. calycinum* (A. C. Smith) Sleumer.

Calyx-tube smooth, the lobes 2–3.5 mm. long; corolla strongly ventricose, 8–17 mm. in diameter near base; filaments about 5 mm. long. *C. ventricosum* A. C. Smith, sp. nov.

Leaf-blades 2–6 cm. long, pinnatinerved.

Leaf-blades serrate or at least crenulate at the usually strongly recurved margin; calyx-tube narrowly winged, the limb scarcely 2 mm. long including the lobes. *C. alatum* (Hoer.) Sleumer.

Leaf-blades entire at margin; calyx-lobes 5–7 mm. long.

Calyx-tube and corolla essentially terete, the calyx-lobes with marginal glands; corolla essentially glabrous; filaments firmly connate, the tubules 3–4 times as long as the thecae. *C. nubigenum* A. C. Smith, comb. nov.

Calyx-tube and corolla 5-angled, the calyx-lobes eglandular; corolla villose; filaments free, the tubules 2–3 times as long as the thecae. *C. campii* A. C. Smith, sp. nov.

Sinuses of calyx-limb flattened, the teeth minute, apiculate, scarcely 1 mm. long.

Calyx-tube 5-winged; corolla about 30 mm. long, essentially hypocrateriform, the limb flaring, with lobes 7–8 mm. broad at base; leaf-blades pinnatinerved, with 4–6 secondaries per side. *C. charianthum* A. C. Smith.

Calyx-tube not winged; corolla 45–53 mm. long, subcylindric, the lobes about 3 mm. broad at base; leaf-blades 5- or 7-nerved from or nearly from base. *C. prietoi* A. C. Smith, sp. nov.

Ceratostema pensile (A. C. Smith) A. C. Smith, comb. nov.

Periclesia pensilis A. C. Smith, Contr. U. S. Nat. Herb. 29: 364. 1950.

As mentioned in the above discussion, the connate filaments hardly serve to keep *Periclesia* apart from *Ceratostema*. In its more fundamental characteristics the present species seems closest to *C. peruvianum*, differing in its glandular-pilose inflorescence with large bracts and bracteoles, as well as in its essentially glabrous leaves. Thus far *C. pensile* is known only from the type collection, *Steyermark 53798.*

Ceratostema flexuosum (A. C. Smith) Macbr. Univ. Wyom. Publ. 11: 42. 1944.

Periclesia flexuosa A. C. Smith, Contr. U. S. Nat. Herb. 28: 357. *pl.* 7. 1932.

The species upon which the genus *Periclesia* was founded is also seen to be inseparable from *Ceratostema*, in view of subsequently described species of the complex. The 4-merous flowers and connate filaments can now hardly be considered of generic significance. The species remains known only from the type, *Lobb 79*, of which the precise locality is uncertain.

Ceratostema reginaldii (Sleumer) A. C. Smith, comb. nov.

Periclesia reginaldii Sleumer, Bot. Jahrb. 71: 400. 1941.

Ceratostema macranthum A. C. Smith, Contr. U. S. Nat. Herb. 29: 361. 1950.

Azuay: The eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft. elev., *Camp E-4342, E-4619*. "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 9,000–11,000 ft. elev., *Camp E-722, E-4851*. Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, ca. 10,000 ft. elev., *Camp E-108*. Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), Tambo Chontal to Tambo Consuelo, 5,700–8,000 ft. elev., *Camp E-1579*.

Field notes indicate that the species is diverse in habit, being a climbing vine (sometimes epiphytic), an erect or spreading shrub, or a tree up to 6 m. high; the leaves are deep green and shining above, paler and dull beneath; the inflorescence parts are deep crimson to red, the corolla being somewhat paler within and sometimes with salmon-pink lobes; the fruit is green or pale yellowish and is noted as being eaten by birds.

In recently proposing the new species *C. macranthum* I failed to consider the description of *Periclesia reginaldii*, of which type material is not available to me. However, a careful perusal of Sleumer's description indicates that the two species are identical. Sleumer referred his plant to *Periclesia* because of the connate filaments; these are, even in the type of *C. macranthum* and especially in some of the Camp specimens cited above, firmly coherent in young flowers, becoming at length essentially free. The type of *C. reginaldii* is *R. Espinosa 785*, collected near Loja.

The six collections cited above form a remarkable accretion to the known material of the species, which, as might be expected, proves more variable than indicated in the two previous descriptions. The following emendations should be noted. All of the Camp collections prove to have a much more fugacious indument than described for *C. macranthum*, or, indeed, they are essentially glabrous throughout. The leaves and inflorescence parts (including calyx and corolla) are in the present series glabrous at anthesis, or the calyx-limb may be puberulent only within. As to leaf-shape, nos. *108, 4342,* and *4851* are very similar to *Steyermark 54311*, the type of *C. macranthum*. Numbers *722* and *4619* have leaf-blades more or less ovate and rounded at base, attaining dimensions of 12 × 8 cm. The inflorescence, in the Camp series, sometimes has as many as 15 flowers (although fewer usually develop) and a rachis up to 22 cm. long. The pedicel-length is very variable, sometimes 15–75 mm. on the same specimen (e. g. no. *722*). Slight extensions of floral dimensions may be noted as follows: Calyx sometimes as short as 30 mm. (25 mm. on no. *1579*) at anthesis, with lobes rarely as short as 10 mm.; corolla up to 55 mm. in length, with lobes up to 25 mm., these sometimes partially fused into 3 or 4 instead of 5; anthers up to 45 mm. (or perhaps more) in length, with thecae up to 20 mm. The most extreme specimen of those cited is no. *1579*, which has the leaf-blades nearly lanceolate, 6–7 × 2–3 cm. (i. e. much narrower than usual), and the calyx in young fruit comparatively short.

Ceratostema loranthiflorum Benth. Pl. Hartw. 142. 1844.

Loja: Cerro Villanaco (ca. 7 km west of the city of Loja), 8,000–9,500 ft. elev., *Camp E-163, E-164, E-174* (NY only), *E-175* (NY only), *E-181, E-197, E-674.*

This species has thus far been collected only in the Province of Loja, and even there it has been known from only half a dozen collections. Dr. Camp's new material, therefore, is very welcome as permitting a better understanding of variation within the species. The plants are noted as shrubs from 0.3 to 2 m. high, arising from large subterranean burls. The leaves and flowers are very variable in width; e. g. nos. 175 and 181 have leaves up to 3.5 cm. broad, whereas in other available specimens they hardly exceed 2 cm. in breadth. Dr. Camp notes that the short broad type of leaf is correlated with a broad corolla, while relatively narrow leaves are associated with narrow corollas. No appreciable differences in corolla-length were noted in the various types. Frequently each calyx-lobe bears an inconspicuous callose gland dorsally near its base.

Ceratostema ventricosum A. C. Smith, sp. nov.

Frutex epiphyticus interdum scandens, ramulis gracilibus juventute albido-puberulis mox glabratis cinerascentibus; stipulis intrapetiolaribus inconspicuis oblongis circiter 2 mm. longis acuminatis; petiolis subteretibus rugulosis 2–6 mm. longis ut ramulis primo puberulis; laminis glabris in sicco fusco-viridibus lanceolato- vel ovato-ellipticis, 6–12 cm. longis, 2–5.3 cm. latis, basi obtusis vel rotundatis, in acuminem circiter 1 cm. longum gradatim angustatis, margine haud recurvatis, 5- vel obscure 7-nerviis, nervis intimis ad 1 cm. concurrentibus et costa supra leviter elevatis vel impressis subtus subprominentibus, nervis extimis inconspicuis, rete venularum utrinque prominulo vel supra immerso; inflorescentiis apices ramulorum versus axillaribus racemosis 2–8-floris breviter pedunculatis, rhachi tereti rugulosa 0.8–3 cm. longa obscure albido-puberula, bracteis sub floribus deltoideis 1.5–2.5 mm. longis acutis extus puberulis margine glandulas rigidas circiter 0.2 mm. longas interdum gerentibus; pedicellis teretibus ut rhachi puberulis sub anthesi 13–27 mm. longis articulationem versus incrassatis, paullo infra medium bracteolis 2 bracteis similibus 1.5–2 mm. longis ornatis; calyce sub anthesi 5–7 mm. longo apice 7–9 mm. diametro extus parce puberulo, tubo cylindrico 2–3 mm. longo, limbo subpatente 5-lobato, lobis oblongo-ovatis 2–3.5 mm. longis circiter 3 mm. latis apice apiculatis margine paullo incrassatis saepe glandulam callosam nigrescentem dorso gerentibus, sinibus acutis vel obtusis; disco carnoso annulari-pulvinato glabro; corolla glabra carnosa urceolato-cylindrica sub anthesi 35–47 mm. longa, basim versus conspicue ventricosa et 8–17 mm. diametro, superne angustata, profunde 5-lobata, lobis subulato-lanceolatis circiter 20 mm. longis et basi 3 mm. latis; staminibus 10 corollam fere aequantibus, filamentis submembranaceis liberis vel basim versus subcohaerentibus circiter 5 mm. longis intus parce pilosis, antheris 30–35 mm. longis, thecis 12–19 mm. longis basi obtusis et leviter incurvatis, tubulis gracillimis longitudine thecas subaequantibus per poros obliquos circiter 0.5 mm. longos dehiscentibus; stylo filiformi corollam subaequante, stigmate minute.

Santiago-Zamora: Eastern slope of the cordillera, near junction of Ríos Pailas and Negro, 6,000–7,500 ft. elev., Aug. 20–24, 1945, *Camp E-4912* (coll. *F. Prieto*) (TYPE US 1,989,112; dupl. NY) (basal tuber epiphytic, the branches to 1 m. long; leaves deep green, subnitid above, dull beneath; pedicels bright green, clavate; hypanthium pale green to dull reddish, the articulation well marked, usually also with a dark line; calyx-lobes usually reddish, the pitted glands nigrescent; base of corolla deep crimson, the lobes nigrescent, spreading). Eastern slope and crest of main Cordillera Cutucú, 5,200 ft. elev., *Jorgensen CuJ-39* (NY only) (epiphytic vine; flowers red). Cordillera Cutucú, ridge just south and west of Río Itzintza, 4,500–5,500 ft. elev., *Camp E-1333* (NY only) (high-growing epiphyte; corollas found on ground, crimson, the lobes purple-black).

Of the cited specimens, no. *1333* consists only of fallen corollas, but it may confidently be referred to this species. The other two specimens show some foliar variability, the leaf-blades of no. *CuJ-39* tending to be more ovate and broader than those of the type, with rounded rather than obtuse bases. In inflorescence characters the two specimens are essentially identical, except that No. *CuJ-39* has bracts and bracteoles without the marginal glands which occur on the type; both specimens usually have a dorsal gland on each calyx-lobe of a very characteristic type.

Ceratostema ventricosum, although a very distinct species, has characteristics suggestive of several of its allies. Its leaves and inflorescences resemble those of *C. prietoi*, described below, but the calyx-limb is strikingly different, the corolla is more obviously ventricose, and the anther-proportions are different. In its calyx the new species resembles *C. loranthiflorum*, but that species has the calyx-articulation obscure or lacking, the corolla and stamens much shorter, and the leaves very different. From *C. calycinum*, which it resembles somewhat in foliage, *C. ventricosum* differs in its smooth calyx-tube and much shorter and differently shaped lobes, its more strongly ventricose corolla, and its longer filaments.

Ceratostema alatum (Hoer.) Sleumer, Notizbl. Bot. Gart. Berlin 12: 281. 1935.

Azuay: Páramo and sub-páramo area north and northwest of the Páramo del Castillo (ca. 6–8 km. n.-ne. of Sevilla de Oro), 10,000–11,200 ft. elev., *Camp E-5153*. "Oriente" Border, Eastern Cordillera, between Oña and the Río Yacuambi, on crest, 10,000–11,200 ft. elev., *F. Prieto P-295*. "Oriente" Border, Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 9,000–11,000 ft. elev., *Camp E-700*, *E-746*; same locality, 11,000–11,300 ft. elev., *Camp E-4867*; same locality, east of El Pan, 11,000–11,350 ft. elev., *Camp E-1626*.

Field notes indicate the plant as a low shrub, up to 3 m. high in sheltered places; leaves dark green and shining above, pale and dull beneath; pedicels and hypanthium deep crimson or red; corolla deep crimson at base, shading to purple or black at tips of lobes; filaments pink; anthers brown; ripe fruit oblate-spheroid, up to 1.5 cm. long and 2 cm. in diameter, dull reddish, nitid, slightly sweet.

The excellent series of specimens cited above nearly doubles the number of collections known for this species, but the variation does not notably extend the limits of my earlier description (as *Englerodoxa alata* Hoer. in Contr. U. S. Nat. Herb. 28: 350. 1932). The leaves are sometimes up to 3 cm. broad and the corolla may be as short as 35 mm. at anthesis, although more often it exceeds 40 mm. in length. Since my 1932 treatment the following collections have been noted: Province of Pichincha, *Acosta-Solís 8304* (Ch, US); Tungurahua, *Penland & Summers 310* (NY); Santiago-Zamora, *Steyermark 54333* (Ch).

Ceratostema nubigenum (A. C. Smith) A. C. Smith, comb. nov.

Periclesia nubigena A. C. Smith, Contr. U. S. Nat. Herb. 29: 366. 1950.

This is another species which, because of its connate filaments, I originally referred to *Periclesia*. Although, as originally noted, it has certain features suggestive of *Periclesia pensilis* (e. g. *Ceratostema p.*), it is a very distinct species closely related only to the following new entity.

Ceratostema campii A. C. Smith, sp. nov.

Frutex interdum epiphyticus et scandens, ramulis teretibus primo pilis albidis 0.3–0.5 mm. longis villoso-puberulis mox glabratis; stipulis intrapetiolaribus e

basi incrassato subulatis 2–4 mm. longis; petiolis rugulosis crassis 2–5 mm. longis mox glabratis; laminis siccitate fuscis subcoriaceis lanceolato- vel oblongo-ovatis, 2.5–4.5 cm. longis, 1–3 cm. latis, basi rotundatis vel leviter cordatis, apice obtusis vel subacutis, margine valde recurvatis, utrinque primo pallide puberulis etiam parce glanduloso-strigillosis mox glabrescentibus, pinnatinerviis, costa supra plana vel leviter impressa subtus elevata, nervis lateralibus principalibus utrinsecus 2 vel 3 basim versus orientibus curvatis utrinque elevatis vel inconspicuis, rete venularum subimmerso; inflorescentiis axillaribus breviter racemosis 2–4-floris, rhachi angulata 4–6 mm. longa pilis 0.2–0.3 mm. longis albido-puberula, bracteis sub floribus deltoideis 1.5–3 mm. longis acutis extus puberulis; pedicellis sub anthesi 10–16 mm. longis parce villosis basim versus bibracteolatis, bracteolis bracteis similibus, articulatione manifesto; calyce sub anthesi 10–12 mm. longo et apice diametro, tubo circiter 5 mm. longo albido-villoso valde 5-angulato, limbo papyraceo suberecto ad basim 5-lobato extus parce villoso intus glabro utrinque inconspicue luteo-glanduloso, lobis ovato-deltoideis acuminatis 5–7 mm. longis 4–6 mm. latis, sinibus acutis; disco carnoso cupuliformi glabro; corolla carnosa 5-angulata, sub anthesi 37–45 mm. longa et inferne circiter 10 mm. diametro superne angustata, ut calyce albido-villosa, lobis 5 elongato-deltoideis subacutis; staminibus 10 corollam fere aequantibus, filamentis inter se liberis submembranaceis ligulatis 3–4 mm. longis glabris, connectivo superne gradatim angustato, antheris 30–42 mm. longis, thecis 11–12 mm. longis basi subacutis, tubulis gracillimis quam thecis longioribus per poros obliquos circiter 0.5 mm. longos dehiscentibus; stylo filiformi longitudine corollam subaequante, stigmate truncato.

Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, ca. 10,000 ft. elev., July 2, 1944, *Camp E-106* (TYPE US 1,988,934; dupl. NY) (stiff shrub 3 m. high; leaves dull on both surfaces; calyx conspicuously fluted; corolla carnose, deeply grooved, red, apically tinged with yellow). Nudo de Guagrauma, ca. 12 km. south of Zaraguro, 9,500–10,500 ft. elev., *Camp E-134* (NY only) (climbing epiphyte in sotobosque; flowers pendulous; calyx angled; corolla angled, pale crimson, the tip greenish yellow).

The two cited specimens agree very closely in fundamental details, but no. *134* has somewhat the narrower leaves and the larger flowers. The floral dimensions are probably a matter of age; in the description the larger dimensions are probably to be taken as representative of the floral measurements at anthesis.

The new species superficially resembles *C. nubigenum*, differing, as noted in my key, in its villose flowers, its angled calyx-tube and corolla, the absence of marginal calycine glands, its free filaments, and the differently proportioned anther-thecae and -tubules.

Ceratostema charianthum A. C. Smith, Contr. U. S. Nat. Herb. 29: 360. 1950.

Santiago-Zamora: Cordillera Cutucú, ridge just south and west of Río Itzintza, 4,500–5,500 ft. elev., *Camp E-1334* (NY only). Eastern slope and crest of main Cordillera Cutucú, 5,600 ft. elev., *Jorgensen CuJ-44* (NY only). Eastern slopes of the cordillera, near junction of Ríos Pailas and Negro, 6,000–7,500 ft. elev., *Camp E-4932* (coll. *F. Prieto*).

Field notes describe the species as a weak epiphyte or a vine growing on mossy banks or climbing trees in mossy forest, with adventitious roots which become enlarged and tuberous near the stem; leaves deep green above, paler beneath, dull on both sides; calyx pinkish; corolla bright rosy pink to pale crimson.

The three cited specimens are welcome additions to the material of the species, otherwise known only from the type, obtained in the same general region. Slight

amplifications of the original description may be noted: leaf-blades up to 13.5 cm. long, sometimes as narrow as 1.5 cm.; rachis of inflorescence sometimes insignificant, only 2 mm. long; pedicels varying from 5 to 13 mm. in length; calyx sometimes shorter than previously described, only 7 mm. long, the wings more obvious (about 1 mm. broad); corolla-lobes as much as 11 mm. in length; filaments connate toward base rather than completely free.

Ceratostema prietoi A. C. Smith, sp. nov.

Frutex epiphyticus ubique praeter filamentas glaber, ramulis gracilibus teretibus fuscis cinerascentibus; petiolis subteretibus rugulosis 3–5 mm. longis; laminis in sicco subcoriaceis vel papyraceis fusco-viridibus elliptico-lanceolatis, 10–17 cm. longis, 3–6 cm. latis, basi anguste rotundatis, in acuminem gracilem 1–2 cm. longum gradatim angustatis, margine integris et anguste recurvatis, 5(vel 7-)-nerviis, nervis e basi orientibus vel interioribus interdum ad 1–2 cm. concurrentibus, costa nervisque principalibus supra leviter impressis subtus elevatis, rete venularum utrinque subimmerso vel prominulo; inflorescentiis e ramulis infra folia orientibus racemosis 3–12-floris, rhachi subtereti 0.5–3 cm. longa breviter pedunculata, bracteis sub floribus deltoideis circiter 1 mm. longis mox caducis; pedicellis teretibus 13–20 mm. longis superne incrassatis, basim versus bracteolis 2 deltoideo-subulatis circiter 0.7 mm. longis caducis ornatis, articulatione conspicuo; calyce sub anthesi 7–9 mm. longo et apice diametro, tubo cupuliformi circiter 5 mm. longo ruguloso haud angulato, limbo subererecto papyraceo quam tubo breviore 5-dentato, dentibus apiculatis 0.5–1 mm. longis, sinibus complanatis; disco carnoso annulari-pulvinato; corolla carnosa cylindrica 45–53 mm. longa, basim versus 7–9 mm. diametro, superne angustata, profunde 5-lobata, lobis deltoideo-lanceolatis circiter 15 mm. longis et basi 3 mm. latis; staminibus 10 corollam fere aequantibus, filamentis liberis ligulatis 7–9 mm. longis ubique pallide puberulis, antheris circiter 40 mm. longis, thecis 9–11 mm. longis basi obtusis, tubulis quam thecis multo longioribus gracillimis per poros obliquos circiter 0.5 mm. longos dehiscentibus; stylo filiformi leviter exserto, stigmate minuto.

Cañar: Near El Corazón, between S. Vicente and Rosario, 3,500 ft. elev., Sept. 6–10, 1944, *F. Prieto CP-13* (TYPE US 1,988,905; dupl. NY) (high-growing epiphyte; leaves dull on both surfaces and not markedly "veiny" when fresh; corolla pale rosy pink, the lobes bright green). Valley of rio de Cañar at Abadel, below town of Galleturo, 6,000 ft. elev., *Prieto CP-28* (epiphyte, the branches drooping, to 2 m. long; leaves dark green above, pale below, dull on both surfaces; corolla deep pink, the tips of lobes green); same locality, 4,400 ft. elev., *Prieto* CP-34 (epiphytic shrub; corolla crimson, the lobes green).

This very distinct new species resembles *C. charianthum* in general aspect and like that species has a calyx-limb with minute teeth and flattened sinuses. It differs obviously in its smooth rather than winged calyx-tube, its differently shaped and longer corolla with narrower lobes, its longer stamens, and its leaf-blades with the principal nerves oriented essentially from the base.

Oreanthes glanduliferus A. C. Smith, sp. nov.

Frutex epiphyticus, ramulis gracillimis obtuse angulatis subfuscis pallide puberulis et interdum parce glanduloso-hispidulis, mox glabrescentibus cinerascentibus; stipulis inconspicuis intrapetiolaribus oblongis obtusis circiter 1 mm. longis saepe ramulos adnatis; petiolis subteretibus rugulosis 1.5–3 mm. longis glanduloso-hispidulis (pilis 0.3–0.7 mm. longis) etiam puberulis mox glabratis; laminis in sicco coriaceis (in vivo subsucculentis et inflatis) elliptico-ovatis, 2.5–4.2 cm. longis, 1.3–2.3 cm. latis (apices ramulorum versus interdum 15 × 8 mm.), basi late obtusis vel subrotundatis, apice obtusis, margine siccitate sub-

cartilagineis et paullo recurvatis, juventute utrinque ut petiolis parce glanduloso-hispidulis mox glabratis, e basi obscure 3- vel 5-nerviis, costa supra leviter impressa subtus elevata vel ut nervis utrinque immersa; inflorescentiis axillaribus 1–3-floris, rhachi subnulla, bracteis sub pedicellis deltoideis circiter 1 mm. longis; pedicellis teretibus gracillimis sub anthesi 5–20 mm. longis, pilis glanduloso-capitatis 0.4–0.7 mm. longis copiose hispidulis ac etiam pilis eglandulosis circiter 0.1 mm. longis pallide hispidulis; calyce sub anthesi 7–10 mm. longo et circiter 3 mm. diametro cum pedicello continuo extus ut pedicello copiose glanduloso-hispidulo et puberulo, tubo obovoideo 3–6.5 mm. longo (paullo post anthesin), limbo erecto ad basim 5-lobato, lobis papyraceis lineari-subulatis 3.5–4.5 mm. longis basi circiter 1 mm. latis intus glabris; disco carnoso annulari-pulvinato glabro; corolla in sicco submembranacea subcylindrica, 20–22 mm. longa, basim versus 3–5 mm. diametro, basi ipso et faucibus contracta, extus parce glanduloso-hispidula etiam pallide puberula, lobis sub anthesi patentibus oblongis 3.5–4 × 1–2 mm. apice obtusis; staminibus 5 corolla fere aequilongis, filamentis leviter cohaerentibus submembranaceis 2–2.5 mm. longis glabris, thecis levibus membranaceis circiter 3.5 mm. longis basi obtusis et leviter incurvatis, tubulis 14–15 mm. longis gracillimis per poros subterminales dehiscentibus; stylo filiformi leviter exserto, stigmate subtruncato.

Cañar: Valley of Río de Cañar at Abadel, below town of Galleturo, 6,000 ft. elev., Sept. 6–10, 1944, *F. Prieto CP-29* (TYPE US 1,988,910; dupl. NY) (epiphyte; leaves pale green, only slightly shining, inflated and subsucculent; corolla crimson); same locality, 4,400 ft. elev., *F. Prieto CP-37* (unicate, NY) (epiphyte; leaves subsucculent and inflated; corolla crimson).

The second known species of *Oreanthes*, described above, differs from *O. buxifolius* Benth. in its conspicuous and slender pedicels, the copious hispid-glandular pubescence of its flowers (present also but less obvious on other parts of the plant), its comparatively short and essentially free filaments, and its differently proportioned anthers, of which the thecae are much shorter. The genus *Oreanthes* remains an extremely rare entity in collections. It is apparently restricted to Ecuador, but since noting only the type collection of *O. buxifolius* in my 1932 treatment (Contr. U. S. Nat. Herb. 28: 359), I have seen two other collections of that species, *Penland 62* (NY) from Loja and *1180* (NY) from Tungurahua.

Macleania macrantha Benth. Pl. Hartw. 223. 1846.

Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, about 6,000 ft. elev., *Camp E-1737* (shrubs, arching to 2–3 m.; leaves very green above, very pale beneath; pedicels green; hypanthium winged, reddish or green; corolla deep crimson to coral-red, carnose; filament-tube pink, the connectives white, the anthers yellow).

The type of this striking species also comes from the vicinity of Quito. It seems probable that *Camp E-1718* (NY only) (shrub 1 m.; leaves deep green above, pale beneath; hypanthium grooved), from the same locality as no. *1737*, represents a stage of *M. macrantha* with very young flower-buds. In this stage the corolla is subglobose and less than 5 mm. long, but the minute anthers are seen to be typically single-tubuled. A series of developing flowers would be very informative in evaluating corolla-length as a specific criterion in this section of *Macleania*; it is likely that too much weight has been given to this character.

Macleania floribunda Hook. Ic. Pl. 2: *pl. 109.* 1837.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, Sierra de los Leones, near Baños, 7,000 ft. elev., *Camp E-1697* (NY only) (subepiphytic; flowers coral-red).

The cited specimen agrees excellently in detail with the type and only previously known collection, *Mathews 1442*, from the Department of Amazonas, Peru. In no. *1697* the corolla has a fugacious white puberulence as well as the characteristic and more persistent brownish glandular hairs, this being the only difference noted between it and the type.

Macleania recumbens A. C. Smith, sp. nov.

Frutex subrecumbens, ramulis gracilibus subteretibus brunneis glabris mox decorticantibus; petiolis rugulosis 3-5 mm. longis superne angulatis; laminis subcoriaceis in sicco fusco-olivaceis ovatis, (3.5-)7-11 cm. longis, (2-)3-7 cm. latis, basi acutis et in petiolum decurrentibus, in acuminem ad 2 cm. longum gradatim angustatis raro tantum breviter acuminatis, margine integris leviter recurvatis, supra glabris, subtus dispersim et minute glanduloso-strigillosis, costa et nervis utrinsecus 2 vel 3 ad 2 cm. supra basim orientibus adscendentibus supra impressis subtus valde elevatis, venulis subimmersis; floribus axillaribus solitariis bracteis pluribus papyraceis deltoideis subacutis circiter 1 mm. longis subtentis, pedicellis gracilibus striatis (forsan 5-sulcatis) sub anthesi 8-9 mm. longis basim versus minute bibracteolatis; calyce turbinato sub anthesi circiter 9 mm. longo et apice 6 mm. diametro, tubo elongato circiter 7 mm. longo basim versus obscure pallido-glanduloso-strigilloso alis carnosis circiter 1.5 mm. latis manifeste 5-alato, limbo erecto minutissime 5-denticulato, sinibus complanatis; corolla carnosa cylindrica circiter 25 mm. longa et basim versus 5 mm. diametro, faucibus contracta, intus apicem versus albido-pilosa alioqui glabra, lobis 5 oblongis subacutis circiter 3 mm. longis; staminibus 10 circiter 11 mm. longis, filamentis in tubum glabrum submembranaceum circiter 5 mm. longum connatis, antheris 7.5-8 mm. longis, thecis 4.5-5 mm. longis basi inflexis, tubulo unico 2.5-3 mm. longo conico, rima ovali subaequilonga; stylo filiformi corollam subaequante truncato.

El Oro: In Moro-Moro region (about 21 miles west of Portovelo), 3,400-4,200 ft. elev., Oct. 7, 1944, *Camp E-627* (TYPE US 1,988,986; dupl. NY) (plants subrecumbent, with some branches to 1 m. long, in dense rain-forest; flowers solitary in axils of leaves; corolla deep coral-red).

The new species is probably most closely related to *M. floribunda* Hook., differing in its larger and longer-acuminate leaf-blades and its essentially glabrous (rather than distinctly castaneous-glandular-strigillose) flowers. The species in this section of *Macleania* (i. e. the species numbered 1 to 6 in my key in Contr. U. S. Nat. Herb. 28: 360. 1932) are fairly close and are not well represented in herbaria; an eventual reconsideration of specific lines will certainly be desirable. Within this alliance, the new species is close only to *M. floribunda* and *M. angulata* Hook., being distinguished from the latter by having its leaf-blades more definitely narrowed at both ends, its flowers solitary and with much shorter pedicels, and its corolla cylindric rather than angled.

Macleania sleumeriana A. C. Smith, Contr. U. S. Nat. Herb. 29: 367. 1950.

Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, about 6,000 ft. elev., *Camp E-1735* (NY only) (terrestrial shrubs 0.4-1 m. high; leaves deep green above, pale beneath; upper part of pedicels and hypanthium bright red-orange at anthesis, later fading to cream-yellow, with only the wings red-tinged; base of corolla reddish coral, the upper half deep green).

The species (*Anthopterus ericae* Sleumer, non *Macleania ericae* Sleumer) appears to be rare; this is only the third collection known to me, all being from northern Ecuador.

Macleania salapa (Benth.) Benth. & Hook. Gen. Pl. 2: 566. 1876.

Loja: Nudo de Cajanuma (south of Loja), 7,600 ft. elev., *Camp E-569* (shrub 2 m.; hypanthium ribbed; corolla pale pink). Mataperro region, a pass between the Cordillera de Cisne and the Cordillera Chicuanco, about halfway between Zaruma and Loja, 7,100 ft. elev., *Camp E-646* (shrub to 3 m., common on dry soil in the pass; flowers pale red).

Apparently limited to southern Ecuador; I have seen specimens from only Loja and El Oro. The combination was not properly made in Genera Plantarum, and perhaps the correct citation of the authority should be (Benth.) Hook. f. ex Hoer. Bot. Jahrb. 42: 269. 1909.

Macleania rupestris (H. B. K.) A. C. Smith, Phytologia 1: 131. 1935.

Carchi: Slopes of Volcán Chiles, *Camp E-319, E-320, E-327, E-334.* East of Tulcan, *Camp E-363.* Pichincha: West of Quito, on Sto. Domingo Road, *Camp E-1706, E-1707, E-1719.* Cañar: Between Tambo and Suscal, north rim of the valley of the Rio de Cañar, *Camp* (coll. *M. Giler*) *E-2766, E-2770A, E-2770B.* Azuay: Along the Río Matadero, west of Cuenca, *Camp E-1942, E-1983, E-1985.* Valley of the Río Surucuchu, west of Cuenca, *Camp E-4240.* Along the Río Cumbe, south of Cuenca, *Camp E-2077, E-2080.* Páramo de Tinajillas, south of Cuenca, *Camp E-481.* Loja: Cerro Villanaco, west of Loja, *Camp E-233.*

Dr. Camp's notes pertaining to the extensive suite of specimens cited above are very detailed. Briefly summarized, they indicate that the species was observed in Ecuador at elevations of 8,500–11,400 ft., occurring on páramo, in the páramo-sotobosque zone, or in subpáramo chaparral; specimens were noted as small trees (rarely) or more often as spreading or sprawling shrubs 1.5–6 m. high, sometimes as much-branched vines climbing through low trees; soft-tissued basal burls were often observed; the corolla is pale crimson to pink at base and paler or white distally; the mature fruit is as much as 1.5 cm. in diameter, shining black, and insipid.

In 1932 (Contr. U. S. Nat. Herb. 28: 360–384) I recognized ten Ecuadorian species in the group of *Macleania* with 2-tubuled anthers, although some of these were admittedly segregated on rather insignificant characters. In addition, four species based on Ecuadorian types were reduced to synonymy; one other species from Ecuador, *M. mollis*, has been described more recently. The accumulation of herbarium material since 1932 and a study of the present material incline me to believe that specific lines in the 2-tubuled *Macleaniae* cannot be satisfactorily established by observational methods. Particularly in Ecuador, which seems to be a center of development of the group, the usual specific criteria are combined in such diverse ways that one must assume free inter-breeding among the "species" to be a continuing phenomenon. In view of this, to apply specific names to parts of the population is perhaps undesirable; but nevertheless I have identified the Camp collections according to current concepts, with the reservation that these concepts may be far from natural.

Macleania rupestris (based on the oldest available specific epithet for this group, *Thibaudia rupestris* H. B. K. 1818), in the strict sense, is characterized by being essentially glabrous throughout, with flowers of moderate size (corolla usually 15–20 mm. long) and stamens with tubules subequaling the thecae in length. Its leaves are variable, but in general they are rounded to acute at base and pinnatinerved. The Central American *M. glabra* (Kl.) Hoer. is scarcely to be distinguished from the common South American species.

Macleania pilgeriana Hoer. Bot. Jahrb. 42: 301. 1909.

Pichincha: Páramo west of Quito on Sto. Domingo Road, 11,300 ft. elev., *Camp E-1705, E-1710* (shrubs 1–2 m.; corolla deep red).

The cited specimens agree well with type material (also from Pichincha) in foliage and in the elongate anther-tubules; I doubt whether this entity should be kept apart from *M. rupestris* even on a subspecific level.

Macleania benthamiana Walp. Repert. Bot. 6: 415. 1847.

Chimborazo-Cañar border: Western escarpment, between Sta. Rosa and Joyagshi, 8,300–9,000 ft. elev., *Camp E-4043* (shrub to 2 m., from relatively small burl). Azuay: Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, 9,200 ft. elev., *Camp E-453* (spreading shrub to 3 m.). Same locality, 11,000–11,500 ft. elev., *Camp E-2285* (shrub 2 m., from burl about 0.3 m. in diameter).

The cited specimens have leaves which are deep green above and paler beneath; the hypanthium is greenish to deep red, the corolla crimson to coral or pale pink toward base, paler distally, the filaments white, the anthers orange. The numerous oblong-lanceolate bracts subtending the inflorescence distinguish this entity from *M. rupestris*. It is essentially glabrous throughout and typically has rather large and coriaceous leaves, with the principal nerves strongly raised beneath; the cited specimens, however, have leaves smaller than typical.

Macleania ecuadorensis Hoer. Bot. Jahrb. 42: 300. 1909.

Cañar: Uplands called "Huairacaja," 10–20 km. northeast of Azogues, 11,000 ft. elev., *Camp E-1758* (shrub 4 m.; leaves dull, deep green above, pale beneath; corolla deep pink toward base, apically white, becoming crimson with age). Azuay: Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), 9,000–11,000 ft. elev., *Camp E-725A* (NY only) (erect shrub 2 m.; flowers deep red). Páramo and subpáramo area north and northwest of the Páramo del Castillo, 10,000–11,200 ft. elev., *Camp E-5157* (NY only) (shrub 2 m.; leaves deep green above, pale beneath; corolla basally crimson, the apex and lobes pale pink).

Macleania ecuadorensis has the leaves characteristically white-pilose beneath, with prominent secondary nerves, and regularly oval in shape. However, no. *1758* has narrower than typical leaves, while nos. *725A* and *5157* have the calyx and corolla faintly pilose. The entity seems hardly more than an expression of character-combinations in the general complex of *M. rupestris* and *M. hirtiflora*.

Macleania loeseneriana Hoer. Bot. Jahrb. 42: 302. 1909.

Pichincha: Western slope of the cordillera, Cerro Corazón, 11,000 ft. elev., *Camp E-1647* (NY only) (spreading shrub to 3 m.; leaves dull on both surfaces, deep green above, paler beneath; hypanthium red; corolla basally pale red, apically white; immature fruit dull, non-glaucous).

The robust habit and inflorescence, pilose flowers, and calyx with large subspreading limb make this one of the more easily identified entities among the 2-tubuled *Macleaniae*.

Macleania hirtiflora (Benth.) A. C. Smith, Contr. U. S. Nat. Herb. 28: 382. 1932.

Cañar: Uplands called "Huairacaja," 10–20 km. northeast of Azogues, *Camp E-1756*. Azuay: Páramo de Tinajillas and surrounding chaparral and forests, 30–50 km. south of Cuenca, *Camp E-386*. Cordillera de Alpachaca, *Camp E-285, E-532, E-536, s. n.* (May 22, 1944). Páramo de Carboncilla, about 15 km. south of Oña, *Camp E-554A–E-544F* incl. (NY only). Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), *Camp E-4844*. Eastern Cordillera, between Oña and the Río Yacuambi, *F. Prieto P-231* (NY only).

The cited specimens were collected at elevations of 8,000 to 11,200 ft., on páramo or subpáramo; they are noted as shrubs up to 4 m. high, often spreading from large burls (these sometimes more than 1 m. in diameter); leaves deep green and subnitid above, paler beneath; hypanthium often red or crimson; corolla deep crimson to pink at base, paler or yellowish or white distally; fruit elongate-spherical, when ripe purple-black and up to 1.5 cm. in diameter, sweetish or insipid.

These specimens are variable in details, as indeed are those I referred to this species in 1932 and the numerous ones so identified since that time. It seems unlikely that this concept represents a natural genetic unit; actually the specimens might be construed as representing extreme forms of various strains of *M. rupestris*, characterized by the pilose flowers, a tendency toward shorter corollas and stamens, and frequently pilose leaves. The indument seems persistent on the pedicels and calyx, but it is sometimes fugacious on the corolla. Among the specimens from Azuay, nos. *285, 386, 532,* and *536* have an unusually persistent corolla-indument, as well as a tendency toward very small leaves.

Macleania cf. hirtiflora (Benth.) A. C. Smith.

Cañar: Páramo between Biblian and Cañar, *Camp E-447.* Parroquia Bayas, valley of Río Tabacal, about 15 km. northeast of Azogues, *F. Prieto P-118.* Region of San Marcos, about 10 km. northeast of Azogues, *F, Prieto P-80.* Uplands called "Huairacaja," 10–20 km. northeast of Azogues, *Camp E-1754, E-1811.* Azuay: Cruz Pamba region above Baños, about 15 km. southwest of Cuenca, *Camp E-3939* (coll. *M. Giler & F. Prieto*). The eastern Cordillera, 4–6 km. north of the village of Sevilla de Oro, *Camp E-4702.* Vicinity of El Pan, *Camp E-500.* Páramo del Castillo and surrounding forested areas (crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez), *Camp E-716, E-721* (NY only), *E-724* (NY only).

The cited specimens were obtained at elevations between 8,500 and 11,000 ft.; they came from erect, spreading, or scrambling shrubs 2–5 m. high, sometimes with large soft burls; leaves deep green and subnitid above, pale and dull beneath; hypanthium crimson; corolla crimson to pink, tipped with yellow, white, or pale pink; fruit ellipsoid, when mature about 2 × 1.5 cm., pink- or red-flushed, sweetish but flat in taste; local name *guayapa*, used for plants of this general affinity.

These collections agree with *M. hirtiflora* in the indument of their flowers and sometimes of their foliage, but their inflorescences are subtended by elongate bracts similar to (or approaching in size) those of *M. benthamiana*. It must be assumed, I think, that these two species are interfertile where their ranges coincide, if indeed either species is more than a series of variations from *M. rupestris.* The cited specimens also suggest other "species" of this complex. In some, e. g. no. *4702*, the leaves may be coriaceous and prominently nerved as in typical *M. benthamiana*, but sometimes strictly glabrous and sometimes pilose in precisely the manner typical for *M. ecuadorensis*. Number *721* is accompanied by extraordinarily large leaves (blades up to 16 × 10 cm.), although its inflorescences are associated with leaves of normal size.

Macleania mollis A. C. Smith, Phytologia **1**: 132. 1935.

Cañar: Valley of Río de Cañar at "Selem," between Galleturo and Cañar, 7,000 ft. elev., *F. Prieto CP-38, CP-39* (terrestrial shrubs 2 m.; leaves deep green, dull or somewhat shining; corolla coral-red).

These are the only collections of the species known to me except for the type, from Chimborazo. While this entity is not too distinct from certain forms of *M. hirtiflora*, it is distinguishable by its subcordate leaf-blades with more basally oriented and ascending secondary nerves, its few-flowered fasciculate inflorescences, and its corollas averaging longer. On the whole, *M. mollis* seems a stronger "species" than most of this relationship.

Macleania coccoloboides A. C. Smith, sp. nov.

Frutex ad 3 m. altus vel epiphyticus et subscandens ubique praeter ramulos et petiolos glaber, ramulis robustis subteretibus nigrescentibus primo et petiolis minute pallido-puberulis mox glabratis; petiolis crassis (2–5 mm. diametro) subteretibus rugulosis 3–7 mm. longis; laminis in sicco coriaceis fusco-viridibus suborbiculari-ovatis, (4–)6–15 cm. longis, (3–)4–9.5 cm. latis, basi rotundatis vel leviter cordatis, apice rotundatis (juventute forsan late obtusis), margine incrassatis et leviter recurvatis, ubique dispersim punctato-glandulosis, pinnatinerviis, costa supra leviter insculpta subtus prominente, nervis secundariis utrinsecus 3 vel 4 supra subplanis vel prominulis subtus valde elevatis, inferioribus e costa basim versus orientibus curvato-adscendentibus, superioribus debilioribus, rete venularum immerso vel utrinque haud prominulo; inflorescentia axillari congesta breviter racemosa ut videtur 7–10-flora bracteis numerosis subcoriaceis oblongo-deltoideis circiter 2 mm. longis basi circumdata, bracteis floriferis reniformibus 1–1.5 mm. longis, rhachi crassa sub fructu 5–7 mm. longa; pedicellis crassis teretibus rugulosis sub anthesi ad 9 mm. sub fructu ad 20 mm. longis, apice conspicue incrassatis et margine apicali obscure glandulosis, cum calyce manifeste articulatis, basim versus bibracteolatis, bracteolis late deltoideis 1–2 mm. longis circiter 2.5 mm. latis obtusis; calyce sub anthesi 7–8 mm. longo et apice diametro ubique dispersim nigro-punctato-glanduloso, tubo cupuliformi circiter 5 mm. longo, limbo suberecto carnoso 2–3 mm. longo minute 5-denticulato, sinibus complanatis; corolla carnosa urceolato-cylindrica sub anthesi 13–14 mm. longa et basim versus circiter 7 mm. diametro, superne paullo angustata, lobis 5 deltoideis subacutis circiter 1.5 mm. longis; staminibus 10 quam corolla multo brevioribus, filamentis ligulatis 1.5–2 mm. longis, connectivis latis, antheris circiter 7 mm. longis, thecis crassis quadrangularibus circiter 5 mm. longis basi obtusis et incurvis in tubulos 2 graciles acutos circiter 2 mm. longos saepe ad basim liberos rimis elongatis ovalibus dehiscentes abrupte angustatis; stylo filiformi corollam subaequante, stigmate minuto; fructibus elongato-subglobosis ad 1 cm. diametro calycis limbo coronatis.

Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, 7,000–8,500 ft. elev., Jan. 15, 1945, *Camp E-1726A* (TYPE US 1,989,052; dupl. NY) (shrub 1–3 m., arching from banks, arising from a burl up to 0.3 m. in diameter, also seen as a high-growing epiphyte and then also with burl; branches sooty-black; leaves very deep green above, pale to subglaucous beneath, with glands at first black and later conspicuous by the presence of a white fungus; hypanthium pale yellow to red, very shallowly grooved, the calyx margin and sometimes the base with notable pits; corolla deep crimson; fruit ripening deep purple-black, shining), *E-1726B* (NY only) (young plant of no. *1726A*, showing the burl, this soft-parenchymatous, not woody). Same general locality, Cerro Corazón, 8,000–9,300 ft. elev., *Camp E-1679* (NY only) (epiphytic and vine-like; twigs dark, blackish; leaves exceptionally dark green above, pale and glaucous beneath; immature fruits pale, subtranslucent).

This new species is readily distinguished by its comparatively short corollas and anthers abruptly terminating in very short, slender tubules. It does not seem to have very close allies, but in some ways it suggests *M. costeroides* Sleumer (Bot. Jahrb. **71**: 401. 1941), also of Ecuador. From this, *M. coccoloboides* differs in its larger leaf-blades with more highly connate nerves, its very short inflorescences, minutely denticulate calyx-limb, longer corolla, and stamens with free filaments and separate tubules.

Psammisia corallina A. C. Smith, sp. nov.

Frutex epiphyticus ubique glaber; ramulis robustis obtuse angulatis in sicco striatis fuscis; petiolis valde rugulosis angulatis incrassatis 10–12 mm. longis;

laminis coriaceis siccitate fuscis ellipticis, 10–15 cm. longis, 6–7.5 cm. latis, basi acutis et in petiolum conspicue decurrentibus, apice breviter et obtuse cuspidatis, margine valde recurvatis, 5-nerviis, nervis summis cum costa 1–3 cm. concurrentibus et cum costa supra leviter impressis (basim versus elevatis) subtus prominentibus, nervis infimis basalibus inconspicuis, rete venularum utrinque prominulo vel immerso; inflorescentiis 1–3 in axillis foliorum breviter racemosis 6–15-floris, floribus caducis, rhachi robusta 2–4 cm. longa articulationibus valde incrassata, bracteis sub floribus papyraceis deltoideis 1–1.5 mm. longis subacutis; pedicellis robustis sub anthesi 15–25 mm. sub fructu juvenili ad 35 mm. longis basim versus bibracteolatis, bracteolis minutis; calyce carnoso sub anthesi 6–7 mm. longo et 8–9 mm. diametro, tubo obtuse angulato 3–4 mm. longo, limbo subpatente 5-denticulato margine leviter incrassato et inflexo, lobis haud 1.5 mm. longis apiculatis, sinibus complanatis vel rotundatis; disco conspicue annularipulvinato; corolla carnosa subgloboso-conica sub anthesi circiter 9 mm. longa et 8 mm. diametro, lobis deltoideis subacutis circiter 1.5 mm. longis; staminibus 10, filamentis in tubum 1.5–2 mm. longum connatis, connectivis ecalcaratis, antheris maturis circiter 7.5 mm. longis, thecis crassis circiter 6 mm. longis basi obtusis superne in tubulos breves acutos cum rimis angustis angustatis; stylo tereti corollam subaequante truncato.

Santiago-Zamora: Cordillera Cutucú, ridge between the Ríos Itzintza and Chupiasa, 4,000–4,500 ft. elev., Nov. 17–Dec. 5, 1944, *Camp E-1280* (TYPE US 1,989,014; dupl. NY) (epiphyte, with branches about 1 m.; leaves dark green above, pale beneath; pedicels and hypanthium pale pink, the corolla coral-red).

From its closest relative, the Colombian *P. occidentalis* A. C. Smith, the new species is readily distinguished by its much more robust inflorescence, with stouter and longer rachis and pedicels and larger flowers; the largest corollas seen in *P. occidentalis* hardly exceed 5 mm. nor the longest anthers 3 mm. in length. The Ecuadorian *P. flaviflora* A. C. Smith (Jour. Arnold Arb. 24: 463. 1943) is less closely related to the new species, differing in its caudate-acuminate leaf-blades, short inflorescence, calyx-limb with larger lobes and acute sinuses, free filaments, and shorter, spurred anthers.

Psammisia ecuadorensis Hoer. Bot. Jahrb. 42: 308. 1909.

Cañar: Near El Corazón, between S. Vicente and Rosario, 3,500 ft. elev., *F. Prieto CP-12* (low-growing epiphyte with pendant branches 1–3 m. long; leaves dull above, shining beneath; pedicels coral-red; corolla deep crimson).

The species is known from several Ecuadorian collections and possibly extends northward into Colombia.

Psammisia ferruginea A. C. Smith, Contr. U. S. Nat. Herb. 28: 391. *pl. 10.* 1932.

Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, about 6,000 ft. elev., *Camp E-1736* (shrub, with branches 3 m. long). Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, Shell Mera (east of Mera), about 3,500 ft. elev., *Camp E-1701* (NY only) (large spreading plant, in part epiphytic; flowers pink). Same locality, uplands near El Topo, along trail to La Gloria, 4,000–5,000 ft. elev., *Camp E-2399* (NY only) (arching epiphyte, common at lower elevations). Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Tres Ranchos and Chontal, 2,700–5,700 ft. elev., *Camp E-1566* (epiphytic vine; hypanthium pale red; corolla pale yellow at anthesis, later pale red). Cordillera Cutucú, ridge ascending into central Cutucú, 4,400–4,700 ft. elev., *Camp E-1159* (immense climbing and epiphytic plants, some 5 m. across and hanging over 10 m., common along streams on west slope of the Cutucú; pedicels

and calyx pink-tinged; corolla yellow in bud, at anthesis tinged with pink under the crimson hairs; body of corolla red at about time it is ready to fall, and crimson as it lies on the ground; some plants with flowers redder than others at anthesis). Same locality, on banks of Río Itzintza, 3,500 ft. elev., *Camp E-1199* (high-climbing epiphyte, common in this region but seen only along streams; leaves green above, paler beneath; pedicels and hypanthium crimson; corolla yellow in bud, with crimson hairs, becoming red or even crimson in age, apically constricted; filaments and connectives white, the anthers yellow).

The excellent series of specimens cited forms a welcome addition to the herbarium material of this species, which otherwise I have known only from southern Colombia (Cauca, El Valle, Nariño, and Putumayo). Dr. Camp's material, of course, demonstrates a few minor variations from the original description, but the fundamental characters of the species are unmistakable.

Psammisia sodiroi Hoer. Bot. Jahrb. 42: 306. 1909.

Pichincha: Western slope of the cordillera, Cerro Corazón, 8,000–9,300 ft. elev., *Camp E-1680* (vine-like epiphyte; leaves pale green and dull above, paler but subnitid beneath; pedicel basally greenish, apically bright coral-red; hypanthium bright coral-red at anthesis, the color fading to dark green as the fruit enlarges; corolla deep red toward base, pale green in upper half; flowering irregular, sometimes at apex of stem, or later on nearly bare wood). Along the road from Quito to Sto. Domingo de los Colorados, 7,000–8,500 ft. elev., *Camp E-1728* (NY only) (shrub 3 m.; leaves pale green and dull above, subnitid beneath; hypanthium pale coral-red; base of corolla deep crimson, the apex green).

The cited specimens are very typical of the species, which is known from several collections from Pichincha and extends northward into Nariño. Sleumer inadvertently omitted this species from his review of the *Psammisiae* with pinnatinerved leaves (Bot. Jahrb. 71: 403–404. 1941).

Psammisia oreogenes Sleumer, Bot. Jahrb. 71: 403. 1941.

Pichincha: Western slope of the cordillera, Cerro Corazón, 8,000–9,300 ft. elev., *Camp E-1677* (vine-like epiphyte; leaves deep green above, pale beneath; at anthesis peduncles deep coral-red and hypanthium pale coral, deeply grooved; base of corolla red, white toward the end, the apex green; bracts and pedicels green; flowers in axils of leaves), *Camp E-1678* (NY only) (epiphytic vine, with flowers on old wood; pedicels deep coral-red, the bracts green; hypanthium pale yellowish coral; lower part of corolla red, the apex green, without white zone noted in no. *1677* but in same stage, the corolla much broader).

In foliage these two specimens appear conspecific, but unfortunately the flowers described for no. *1678* have been lost. Differences can be observed between these plants and the description of *P. oreogenes*, typified by *Heilborn 488*, also from Pichincha. Dr. Camp's specimens have the petioles slightly longer, the pedicels shorter, more slender, and glandular-pilose distally rather than glabrous, the calyx glandular-strigillose rather than glabrous, the stamens somewhat longer (about 9 mm. long), and the anther-tubules about 5 mm. rather than 2.5–3 mm. long. Our specimens differ from the allied *P. sodiroi* in the merely apiculate calyx-limb, the longer corolla, and in details of venation, in which characters they seem to agree with Sleumer's species.

Psammisia idalima A. C. Smith, sp. nov.

Frutex subscandens ubique praeter filamenta glaber, ramulis gracilibus subteretibus fuscis, internodiis bracteas papyraceas lanceolato-oblongas 5–10 mm. longas obtusas interdum gerentibus; petiolis crassis subteretibus rugulosis ni-

grescentibus 5–10 mm. longis; laminis in sicco subcoriaceis metallico-olivaceis oblongo-ellipticis, (12–)15–25 cm. longis, (3.5–)5–10 cm. latis, basi late obtusis et in petiolum subito decurrentibus, apice breviter acuminatis, margine leviter recurvatis, pinnatinerviis, costa supra elevata vel superne impressa subtus prominente, nervis lateralibus utrinsecus 5–7 arcuato-adscendentibus anastomosantibus supra subplanis subtus elevatis, rete venularum subimmerso vel utrinque paullo prominulo; inflorescentia axillari vel infra folia enata breviter racemosa 6–9-flora; rhachi angulata 5–10 mm. longa, bracteis sub floribus papyraceis oblongis 2–3 mm. longis obtusis; pedicellis gracilibus sub anthesi 12–18 mm. sub fructu ad 20 mm. longis basim versus bibracteolatis, bracteolis subpapyraceis ovato-deltoideis 2–2.5 mm. longis circiter 1.5 mm. latis subacutis pauciglanduloso-marginatis; calyce sub anthesi circiter 6 mm. longo et apice 7–8 mm. diametro, tubo cupuliformi circiter 3 mm. longo, limbo papyraceo erecto-patente profunde 5-lobato, lobis oblongo-ovatis 2–3 mm. longis circiter 3 mm. latis praeter apicem apiculatum crasso-marginatis, sinibus acutis; corolla carnosa urceolata sub anthesi 7.5–8 mm. longa et basim versus circiter 5 mm. diametro faucibus angustata, lobis 5 oblongis subacutis circiter 1 mm. longis; staminibus 10, filamentis submembranaceis circiter 1 mm. longis interdum superne intus minutissime pilosis in connectivos graciles ecalcaratos angustatis, antheris 3.5–4 mm. longis, thecis circiter 2.5 mm. longis basi incurvatis, tubulis 1–1.5 mm. longis per rimas elongatas dehiscentibus; stylo tereti corollam subaequante, stigmate minuto; fructibus subglobosis in sicco coriaceis rugulosis ad 1 cm. diametro calycis limbo persistente et disco coriaceo pulvinato ad medium depresso coronatis.

Azuay: The eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft. elev., July 27–Aug. 12, 1945, *Camp E-4597* (TYPE US 1,989,098; dupl. NY) (plant vine-like; leaves deep green above, very pale beneath; hypanthium crimson; base of corolla crimson, the apex white; fruit non-glaucous), *Camp E-4379* (vine; leaves deep green and dull above, pale green beneath; pedicels and hypanthium crimson; corolla basally deep pink, apically pale pink to white; immature fruit nitid).

From *P. sodiroi* Hoer., apparently its closest ally, the new species differs in having its leaf-blades slightly thicker in texture and with less prominent venation, its pedicels and calyx more slender, its corolla shorter, and its anthers much shorter and essentially ecalcarate. The small flowers and other obvious combinations of characters readily separate *P. idalima* from other species of this immediate relationship, *P. graebneriana* Hoer., *P. debilis* Sleumer, and *P. oreogenes* Sleumer.

Psammisia sclerantha A. C. Smith, sp. nov.

Frutex parvus interdum epiphyticus ubique praeter filamenta glaber, ramulis teretibus gracillimis fusco-stramineis; petiolis inconspicue angulatis 7–15 mm. longis; laminis subcoriaceis in sicco metallico-olivaceis elliptico-lanceolatis, 11–21 cm. longis, 4–6.5 cm. latis, basim versus gradatim angustatis et in petiolum decurrentibus, apice longe et acute acuminatis, margine leviter recurvatis, pinnatinerviis, costa supra paullo subtus valde elevata, nervis lateralibus utrinsecus 4 vel 5 erecto-patentibus anastomosantibus supra subplanis subtus paullo elevatis, venulis utrinque haud prominulis; inflorescentia axillari breviter racemosa 2–7-flora; rhachi gracili obtuse angulata ad 12 mm. longa, bracteis sub floribus papyraceis deltoideo-oblongis obtusis 1–1.5 mm. longis latisque; pedicellis sub anthesi 13–20 mm. longis superne incrassatis et sub calyce conspicue articulatis basim versus bibracteolatis, bracteolis bracteis similibus minoribus; calyce cupuliformi sub anthesi circiter 6 mm. longo et 8 mm. diametro, tubo brevi et lato, limbo crasso-carnoso erecto-patente 3–4 mm. longo lobis haud 1 mm. longis inconspicue 5-dentato praeter apices loborum obscure crasso-marginato,

sinibus complanatis vel late obtusis; corolla cylindrica sub anthesi 8–9 mm. longa 4–6 mm. diametro superne conspicue crasso-carnosa, lobis 5 deltoideis circiter 2 × 2 mm. acutis sub anthesi inflexis; staminibus 10, filamentis submembranaceis pallidis ligulatis 2–3 mm. longis superne intus obscure puberulis in connectivos latos omnibus obtuse sed manifeste calcaratos transeuntibus, antheris 4.5–6 mm. longis, thecis crassis subquadratis 3.5–4.5 mm. longis basi incurvatis et obtusis in tubulos graciles 1–1.5 mm. longos cum rimis elongatis ovalibus abrupte angustatis; stylo tereti corollam fere aequante stigmate obscure lobato; fructibus juvenilibus late subglobosis ad 1 cm. latis calycis limbo persistente inflexo et disco coriaceo pulvinato coronatis.

Santiago-Zamora: Cordillera Cutucú, ridge between Río Ontza and Río Chupiasa, 4,300–4,700 ft. elev., Nov. 17–Dec. 5, 1944, *Camp E-1195* (TYPE US 1,989,009; dupl. NY) (leaves deep green above, pale green beneath, dull on both surfaces; pedicels and hypanthium coral-red; corolla green in bud, red as it begins to open, and purple with age). Same locality and altitude, ridge ascending into central Cutucú, *Camp E-1156* (small shrubs 1 m., epiphytic or terrestrial; pedicels and calyx deep coral-red; corolla green, carnose, very hard when open; plants later seen in shade, with nearly white flowers).

Psammisia sclerantha is another of the species with pinnatinerved leaves, characterized by having the calyx-limb and distal part of its corolla extraordinarily thick in texture and its anthers with broad, spurred connectives and very short, slender tubules. From *P. sodiroi* Hoer. and the other species of this alliance except *P. oreogenes* Sleumer, the new species differs in its merely denticulate (rather than conspicuously lobed) calyx-limb. *Psammisia oreogenes*, however, has comparatively short-petioled leaves and a differently proportioned calyx (the limb being shorter and thinner) and anthers.

Psammisia columbiensis Hoer. Bot. Jahrb. 42: 303. 1909.

Azuay: The eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft. elev., *Camp E-4470* (large vine, scrambling to 7 m.; leaves deep green and dull above, pale and subnitid beneath; peduncles bright green; pedicels red at base, becoming crimson above; hypanthium dull crimson, the calyx-lobes tipped with yellow; corolla doubly constricted, crimson to second constriction, the apex and lobes white; filaments united at base; immature fruit dull green).

I am unable to distinguish the cited specimen from *P. columbiensis*, typified by a specimen from Cauca and also now known from Antioquia and Putumayo in Colombia. The species is characterized by its narrow, few-nerved leaves, its elongate inflorescence, and its flowers of medium size for the genus, with large calyx-lobes and connate filaments. The Camp collection has the filaments only loosely united and the anthers very inconspicuously spurred, these points of difference from typical material being the only ones observed.

Another specimen that should be considered here is: *Camp E-1144* (Santiago-Zamora: Cordillera Cutucú, ridge ascending into central Cutucú, 4,400–4,700 ft. elev., a high-climbing often epiphytic vine; pedicels, calyx, and base of corolla deep coral-red, the apex of corolla white). This specimen differs from no. *4470* and Colombian material of the species in having its leaf-blades thinner in texture and with more obvious venation, and in having its anthers only about 7 mm. (rather than 10–11 mm.) long; the filaments are clearly connate in some flowers and essentially free in others, while the inflorescence is characteristically elongate. Until a more comprehensive suite of specimens of this immediate alliance is available, I hesitate to suggest that more than one species is included, although this may prove to be the case.

Psammisia guianensis Kl. Linnaea 24: 43. 1851.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, Shell Mera (east of Mera), about 3,500 ft. elev., *Camp E-1703* (in swampy areas, often epiphytic, with arching branches to 3 m. long; inflorescences coral-red, the young corolla white). Santiago-Zamora: Valley of the Río Zamora, east of Loja, ridge across river from the village of Zamora, about 6,500 ft. elev., *Camp E-31* (NY only) (shrub sprawling over rocks). Uplands along Río Upano just north of junction with Río Chupianza, near Mendez, 1,750–2,500 ft. elev., *Camp E-1004* (NY only) (shrubs on ground or on rotting logs, arching to 3 m.). Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), El Partidero, between the Ríos Paute and Negro, 2,100–3,100 ft. elev., *Camp E-1522* (large epiphytic vine, the branches to 6 m.; leaves deep green above, pale beneath; pedicel, hypanthium, and lower part of corolla deep coral-red, the tip of corolla above constricted part white; filaments and connectives white; anthers brown; immature fruit non-glaucous).

The cited specimens agree excellently with other material representing this widespread species from the eastern slopes of the Andes.

Psammisia ulbrichiana Hoer. Bot. Jahrb. 42: 306. 1909.

Azuay: The eastern cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft. elev., *Camp E-4367* (spreading shrub, the branches ultimately vine-like, to 5 m. long; leaves dark green and subnitid above, pale beneath; immature fruit pale salmon), *Camp E-4402* (vine; leaves deep green and nitid above, pale beneath; immature fruit pale salmon). Santiago-Zamora: Cordillera Cutucú, ridge ascending into central Cutucú, 3,500 ft. elev., *Camp E-1102* (NY only) (high-growing epiphyte, the branches arched to 2 m.; leaves deep green above, pale beneath). Same locality, ridge between Ríos Itzintza and Chupiasa, 4,000–4,500 ft. elev., *Camp E-1271* (coarse climbing epiphyte, with branches to 5 m. long).

The cited specimens are all in fruit, but the comparatively large leaves, short inflorescences with congested floral scars, and calycine characters point to their position in *P. ulbrichiana*, typified by a specimen from the Province of Pichincha.

Psammisia sp.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, Río Tigre, near junction with the Pastaza (below Topo), 5,400 ft. elev., *Camp E-1693* (epiphyte with branches 5 m. long).

In the shape and texture of its leaves, the cited specimen suggests *P. pauciflora* Griseb. ex A. C. Smith, but its persistent calyx-lobes in fruit are rather large for that species. Flowers are needed satisfactorily to place the specimen.

Calopteryx sessiliflora A. C. Smith, sp. nov.

Frutex, ramulis fuscis obtuse angulatis pallide puberulis mox glabratis; stipulis intrapetiolaribus lanceolato-subulatis circiter 7 mm. longis caducis; laminis e ramulis brevibus lateralibus interdum orientibus, ramulis bracteis papyraceis lineari-lanceolatis ad 15 × 2 mm. circumdatis; petiolis incrassatis subteretibus subglabris 5–12 mm. longis; laminis papyraceis in sicco fusco-olivaceis anguste lanceolatis, 13–28 cm. longis, 3.5–7.5 cm. latis, basi late obtusis, in apicem 1–2 cm. longum gradatim angustatis, subtus pilis glandulosis fusco-castaneis 0.2–0.3 mm. longis copiose strigillosis, supra mox glabratis, 5–7-nerviis, nervis secundariis adscendentibus cum costa 2–7 cm. concurrentibus ut costa supra impressis (vel basim versus leviter elevatis) subtus prominentibus, rete venularum supra subimmerso subtus prominulo; inflorescentia ramulis defoliatis enata subfasciculata ut videtur 1- vel 2-flora bracteis numerosis circumdata, bracteis lineari-

lanceolatis obscure glanduloso-marginatis, majoribus circiter 15 × 2 mm., intimis calycem involventibus circiter 10 × 3 mm.; pedicellis subnullis, bracteolis 1 vel 2 lineari-subulatis circiter 7 × 0.5 mm.; calyce 6.5–7 mm. longo et circiter 4 mm. apice diametro pilis minutis glandulosis strigilloso, tubo obtuse 5-angulato circiter 4.5 mm. longo, limbo quam tubo breviore intus glabro fere ad basim 5-lobato, lobis elongato-deltoideis circiter 3 × 2 mm.; disco annulari-pulvinato glabro; corolla tenuiter carnosa parce glanduloso-strigillosa circiter 13 mm. longa et 4 mm. diametro anguste 5-alata, alis medio circiter 0.7 mm. latis superne angustatis, lobis deltoideis subacutis circiter 1 mm. longis; staminibus 10 corollam subaequantibus, filamentis membranaceis circiter 2.5 mm. longis ut videtur connatis superne obscure puberulo-marginatis, antheris circiter 10.5 mm. longis, thecis 4–4.5 mm. longis basi mucronatis, tubulis quam thecis leviter longioribus per rimas elongatas dehiscentibus; stylo filiformi corollam subaequante, stigmate minute peltato.

Santiago-Zamora: Eastern slope and crest of main Cordillera Cutucú, 5,200 ft. elev., Nov. 25–Dec. 2, 1944, *H. Jorgensen CuJ-38* (TYPE US 1,988,919; dupl. NY) (shrub 3 m.; flowers red).

The generic position of this species presents difficulties not unfamiliar in the Andean Vacciniaceae. Although it is clearly of the general affinity of *Thibaudia*, it is perhaps best referred, because of its winged corolla, to the recently described genus *Calopteryx* (Jour. Arnold Arb. 27: 100. 1946), based on a single species from low elevation near the coast in El Valle, Colombia. From the only known species, *C. insignis, C. sessiliflora* differs in its leaf-blades with more highly concurrent secondaries, its greatly reduced 1- or 2-flowered inflorescences subtended by conspicuous lanceolate bracts, its subsessile flowers, its much shorter and more narrowly winged corolla, and its anthers with comparatively short tubules. The discovery of this entity certainly weakens the characters which separate *Calopteryx* from *Thibaudia*, but the former concept may perhaps be maintained for the present.

Thibaudia lateriflora A. C. Smith, sp. nov.

Frutex scandens praeter flores ubique glaber, ramulis gracilibus teretibus inferne radicantibus; petiolis gracilibus rugulosis subteretibus 6–8 mm. longis crassis (2–3 mm. diametro); laminis subpapyraceis in sicco fusco-viridibus oblongo-ellipticis, 17–26 cm. longis, 7–10 cm. latis, basi obtusis, apice in acuminem gracilem ad 25 mm. longum subito caudato-attenuatis, margine inconspicue recurvatis, subtus obscure et sparse glanduloso-strigillosis, plerumque 7-nerviis, nervis secundariis adscendentibus cum costa ad 3.5 cm. concurrentibus ut costa supra leviter impressis subtus prominentibus, nervis extimis inconspicuis, rete venularum intricato supra subimmerso subtus prominulo; inflorescentiis in glomerulos ramulis defoliatis enatos aggregatis, bracteis numerosis obscuris suffultis, rhachi gracili minuta haud 2–3 mm. longa ut videtur plerumque uniflora, bracteis floriferis oblongis obtusis 1–2 mm. longis; pedicellis gracilibus 6–8 mm. longis ut calyce obscure puberulis basim versus bibracteolatis, bracteolis oblongis obtusis 1–1.5 mm. longis; calyce turbinato cum pedicello continuo sub anthesi 4–5.5 mm. longo et apice circiter 3 mm. diametro, obscure albido-puberulo etiam inconspicue glanduloso-strigilloso, tubo alis carnosis haud 0.3 mm. latis inconspicue alato, limbo erecto 1–1.5 mm. longo, lobis 5 inconspicuis ovato-denticulatis haud 0.5 mm. longis, sinibus obtusis; corolla tenuiter carnosa 5-angulata (angulis subalatis alis haud 0.2 mm. latis) sub anthesi 19–22 mm. longa circiter 4.5 mm. diametro obscure puberula mox glabrata, lobis 5 oblongis circiter 1.5 mm. longis; staminibus 10 corollam subaequantibus, filamentis ligulatis subcohaerentibus circiter 3 mm. longis margine superne obscure puberulis, antheris 18–19 mm. longis, thecis levibus 10–11 mm. longis, tubulis 8–9 mm. longis per rimas elongatas dehiscentibus; stylo filiformi leviter exserto, stigmate minute peltato.

Santiago-Zamora: Cordillera Cutucú, ridge ascending into central Cutucú, 2,600 ft. elev., Nov. 17–Dec. 5, 1944, *Camp E-1141* (coll. *F. Prieto*) (TYPE NY; dupl. US) (climbing; leaves dark green above, paler and shining beneath; calyx green-ribbed; corolla ribbed, crimson toward base, bright green distally).

The fact that the calyx is continuous with the pedicel suggests that this species is an ally of the widespread *T. floribunda* H. B. K., from which it differs in such obvious respects as its broader leaves, greatly reduced and glomerulate inflorescences, narrowly winged calyx and corolla, and longer corolla and stamens. That the corolla is winged (although very obscurely so) indicates an affinity of the new species with *Anthopterus* Hook., where, however, the wings are obvious and manifestly veined. From another allied genus, *Calopteryx* A. C. Smith, *T. lateriflora* is excluded by its continuous calyx and also by its very narrow corolla wings. The discovery of such new species as this and the above-described *Calopteryx sessiliflora*, however, suggests that the winged corolla cannot be safely utilized as a character of generic value in the family.

Thibaudia clivalis A. C. Smith, sp. nov.

Frutex epiphyticus ubique praeter antheras glaber, ramulis gracilibus junioribus obtuse angulatis vetustioribus teretibus; foliis subsessilibus, petiolis 1.5–3 mm. longis, laminis coriaceis subbullatis in sicco fusco-brunneis, oblongis vel obovato-oblongis 7.5–12.5 cm. longis, 4–8 cm. latis, basi manifeste cordatis et subauriculatis, apice rotundatis, margine recurvatis et sinuato-crenatis, costa valida supra sulcata vel basim versus elevata subtus prominente, nervis lateralibus utrinsecus 3–5 supra impressis subtus valde elevatis, eis basim versus validioribus curvato-adscendentibus, rete venularum conspicuo utrinque obtuse prominulo; inflorescentia completa non visa; pedicellis teretibus rugulosis ante anthesin circiter 10 mm. longis basi bibracteolatis superne incrassatis, articulatione conspicuo, bracteolis pentagonis circiter 2.5 mm. longis latisque subacutis; calyce turbinato 6–6.5 mm. longo apice 4–5 mm. diametro, tubo ruguloso obtuse angulato circiter 2.5 mm. longo, limbo suberecto carnoso quam tubo longiore 5-lobato, lobis late deltoideo-ovatis circiter 1 × 2 mm. apiculatis, sinibus obtusis; corolla (videtur paullo ante anthesin) urceolato-cylindrica carnosa 8–9 mm. longa basim versus circiter 4 mm. diametro superne angustata, lobis 5 deltoideis circiter 1 mm. longis acutis; staminibus 10, filamentis liberis ligulatis minutis ad 1 mm. longis margine superne pilosis, connectivis alternatis margine copiose albido-villosis (pilis circiter 0.5 mm. longis), alteris obscure puberulis, antheris circiter 6 mm. longis, thecis basi obtusis, tubulis quam thecis paullo brevioribus per rimas ovales magnas dehiscentibus; stylo tereti corollam subaequante truncato.

Santiago-Zamora: Cordillera Cutucú, east-trending slope from top of ridge down toward the Itzintza, 4,800–5,800 ft. elev., Nov. 17–Dec. 5, 1944, *Camp E-1384* (TYPE NY) (epiphyte; leaves dark green above, paler beneath, the veins red; young flowers pink).

Although the cited specimen is not entirely satisfactory, lacking attached or complete inflorescences, it obviously represents an undescribed species of *Thibaudia*. In its apparently rigidly carnose corolla, free filaments, erect elongate calyx-limb, and leaf-texture it suggests the Peruvian *T. engleriana* Hoer. From that species, however, *T. clivalis* differs in having its branchlets less sharply angled and its leaves subsessile, larger, and more deeply cordate at base. The flowers of the new species are not entirely mature, but they are comparatively

small, with much shorter calyx-lobes, corollas, and stamens. Another species of this alliance, *T. cardiophylla* Sleumer, also of Peru, has the leaves smaller than those of the new species and the pedicels and comparatively large calyx densely pubescent.

Thibaudia martiniana A. C. Smith, sp. nov.

Frutex ubique filamentis exceptis glaber, ramis elongatis, ramulis robustis fuscis obtuse angulatis; petiolis crassis (3–5 mm. diametro) 13–20 mm. longis manifeste angulatis; laminis coriaceis in sicco fusco-olivaceis ovato-ellipticis, 20–30 cm. longis, 10–17 cm. latis, basi obtusis et in petiolum decurrentibus, apice ut videtur acutis vel breviter cuspidatis, margine integris et leviter recurvatis, pinnatinerviis, costa supra paullo subtus valde prominente, nervis secundariis utrinsecus plerumque 3 curvatis supra conspicue impressis subtus prominentibus, rete venularum supra subplano vel prominulo vel leviter impresso subtus conspicuo; inflorescentiis axillaribus breviter racemosis circiter 10-floris sed floribus saepe caducis, rhachi crassa superne angulata circiter 1.5 cm. longa, bracteis caducis; pedicellis rugulosis sub anthesi 20–23 mm. longis superne valde incrassatis basim versus bibracteolatis, bracteolis ovato-deltoideis obtusis circiter 2 mm. longis, articulatione conspicuo; calyce coriaceo ruguloso cupuliformi-cylindrico sub anthesi haud apophysato 8–10 mm. longo apice 6–10 mm. diametro, tubo circiter 4 mm. longo, limbo suberecto quam tubo longiore inconspicue 5-dentato, dentibus minute apiculatis haud 0.5 mm. longis, sinibus complanatis; disco carnoso pulvinato; corolla crasso-carnosa cylindrica sub anthesi circiter 25 mm. longa et basim versus 7 mm. diametro, superne gradatim angustata, lobis 5 deltoideis obtusis circiter 1.5 × 2.5 mm.; staminibus 10 corollam subaequantibus, filamentis liberis fuscis ligulatis circiter 5 mm. longis intus superne puberulis, antheris circiter 23 mm. longis crassis basi obtusis, thecis in tubulos 7–8 mm. longos inferne lateraliter connatos rimis elongatis dehiscentes gradatim transeuntibus; stylo crasso sub anthesi leviter exserto, stigmate obscure papilloso.

Pichincha: Along the road from Quito to Sto. Domingo de los Colorados (western slope of the cordillera), 8,500–9,500 ft. elev., Jan. 15, 1945, *Camp E-1717* (TYPE US 1,989,049; dupl. NY) (on banks in soil; branches arching to 4 m.; leaves dark green above, pale beneath, dull on both surfaces; pedicels red, the bracteoles white, the "joint" green; calyx red; corolla pure white).

At the suggestion of the collector, this new species is named for Dr. William E. Martin, of the University of California, in whose company the type specimen was obtained. It is closely related only to *T. pachypoda* A. C. Smith, known from low elevations near the coast of El Valle, Colombia, but it differs in its more robust foliage, the leaf-blades being much larger and with more prominent secondary nerves. The new species also has shorter pedicels, a slightly shorter corolla, and anthers with short tubules which are laterally adnate nearly to the apex.

Another collection which may be mentioned here is *Camp E-626* (NY only), from El Oro, in Moro-Moro region about 21 miles west of Portovelo, 3,400–4,200 ft. elev. (coarse shrub with branches to 3 m. long, in dense rain-forest). As compared with the type of *T. martiniana*, no. *626*, which is past anthesis, has shorter petioles, pedicels up to 33 mm. long, and a shorter calyx-limb with more obvious lobes. Without corroborating evidence from the corolla and stamens, I hesitate to expand the concept of the new species to include this specimen, although it does not suggest any other known species.

Thibaudia parvifolia (Benth.) Hoer. Bot. Jahrb. 42: 275. 1909.

Azuay: "Oriente" Border, crest of Eastern Cordillera, between Oña and the Río Yacuambi, 10,000–11,200 ft. elev., *F. Prieto P-305* (shrub 2 m.; leaves deep green above, bright green beneath, nitid on both surfaces; pedicels stout, green to red-tinged; hypanthium green to dull red; corolla dull reddish to deep crimson, pale distally; hypanthium and corolla with scattered gland-hairs).

The species has apparently not otherwise been reported from Ecuador, but the cited specimen agrees excellently with *Lehmann 2143* (US), from the type locality in Cauca, Colombia, and with several specimens recently obtained by Dr. Cuatrecasas in the Departments of Cauca and El Valle.

Thibaudia jorgensenii A. C. Smith, sp. nov.

Frutex parvus, ramulis gracilibus, junioribus obtuse angulatis pilis albidis circiter 0.5 mm. longis indutis, demum teretibus glabrescentibus; stipulis intrapetiolaribus subulatis circiter 2 mm. longis parce pilosis; petiolis subteretibus rugulosis 2–4 mm. longis ut ramulis mox glabratis; laminis coriaceis in sicco fuscis ovatis, 1.5–3 cm. longis, 0.8–1.5 cm. latis, basi leviter sed manifeste cordatis, apice obtusis, margine incrassatis et inconspicue crenulatis, supra copiose minute albido-punctatis, subtus parce et inconspicue glanduloso-strigillosis, e basi obscure 3-nerviis, costa supra subplana subtus paullo elevata, nervis aliis basalibus et 1 vel 2 paribus e costa orientibus obscuris et immersis; inflorescentia apices ramulorum versus axillari subfasciculata ut videtur pluriflora bracteis imbricatis papyraceis pluribus suborbicularibus obscure piloso-marginatis maximis ad 7 mm. longis basi circumdata; pedicellis subteretibus 1–2 mm. longis pilis albidis 0.3–0.5 mm. longis copiose patenti-pilosis, basi bibracteolatis, bracteolis lineari-oblongis circiter 3 mm. longis margine ciliatis etiam parce glanduloso-pilosis caducis, articulatione manifesto; calyce campanulato sub anthesi circiter 9 mm. longo et apice diametro, tubo parvo haud 2 mm. longo ut pedicello copiose piloso, limbo erecto-patente papyraceo utrinque glabro vel extus inferne parce piloso profunde 5-lobato, lobis ovatis circiter 5 mm. longis (post anthesin ad 8 mm. accrescentibus) 2.5–4 mm. latis imbricatis manifeste nervatis acutis pilos glandulosos circiter 0.5 mm. longos margine gerentibus; corolla tenuiter carnosa cylindrica circiter 10 mm. longa et 4 mm. diametro utroque paullo angustata, extus ut calycis tubo copiose patenti-pilosa, lobis 5 deltoideis subacutis circiter 1 mm. longis; staminibus 10 circiter 7 mm. longis, filamentis liberis ligulatis 2.5–3 mm. longis superne angustatis et margine pilosis, antheris 4.5–5 mm. longis, thecis tubulos longitudine subaequantibus basi inflexis et mucronulatis, rimis ovalibus circiter 1 mm. longis; stylo gracili corollam subaequante, stigmate minute peltato.

Loja: Hda. Anganuma, at headwaters of Río Cachiyacu, on west slopes of Cordillera Condor, about 46 km. south of Loja, 9,400 ft. elev., July 13–16, 1944, *H. Jorgensen & F. Prieto JP-47* (TYPE NY) (shrub, in sotobosque; leaves shining and deep green above, paler beneath; calyx deep pink to red; corolla white).

The available material of the new species is not entirely satisfactory, but one good mature flower has been dissected. Because of its free filaments, the species would be sought among those numbered 10 to 18 in my key of 1932 (Contr. U. S. Nat. Herb. **28**: 411), but its relationship is certainly with *T. anomala* A. C. Sm., based on an André collection without detailed locality. From this, *T. jorgensenii* differs in its leaf-blades with subcordate bases and its subsessile flowers with free filaments; *T. anomala* has the indument of the flowers much denser, covering even the calyx-limb, which in the new species is essentially glabrous.

Cavendishia striata A. C. Smith, Jour. Arnold Arb. **27**: 104. 1946.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, between Baños and Mera, 3,500–5,000 ft. elev., *Camp E-2391* (NY only) (spreading shrub, terrestrial, up to 1 m. high; leaves pale green; bracts pinkish; flower-buds white). Santiago-Zamora: Cordillera Cutucú, on banks of Río Itzintza, 3,500 ft. elev., *Camp E-1207* (NY only) (short-branched epiphyte; bracts flushed with pink; hypanthium greenish, the calyx-lobes white; corolla deep purple toward base, white above).

This recently described species, occurring, like many others of the family, over a wide altitudinal belt in Pacific Colombia, has already been recorded from the Province of Pichincha but not elsewhere in Ecuador. In Colombia it occurs from near sea-level up to 2,000 m. The cited specimens both have very young inflorescences but present no important points of difference from Colombian material; under very high magnification the young bracteoles, calyces, and corollas are seen to be copiously glandular with minute spherical sessile glands.

Cavendishia pseudospicata Sleumer, Bot. Jahrb. 71: 406. 1941.

Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, Shell Mera (east of Mera), about 3,500 ft. elev., *Camp E-1702* (on steep bank, the branches drooping to 8 ft.; also seen as an epiphyte; ripe fruit purple-black, insipid).

The cited specimen, in fruit, agrees excellently, in general, with Sleumer's species, collected in the same region. However, the indument described by Sleumer appears to be fugacious, if my identification is correct. The following differences of no. *1702* from the original description should be noted: leaf-blades slightly larger (up to 10 × 3.5 cm.); inflorescence (except corolla, not seen) essentially glabrous in fruit except for a few scattered appressed glandular hairs; rachis slightly longer (to 11 cm. long).

Cavendishia bracteata (R. & P.) Hoer. Bot. Jahrb. **42**: 280. 1909.

Thibaudia bracteata R. & P. Fl. Peruv. Chil. 4: *pl. 388*. 1802, ex J. St.-Hil. Expos. Fam. Nat. **1**: 363. 1805.

Proclesia hartwegiana Kl. Linnaea **24**: 35. 1851.

Cavendishia hartwegiana Hoer. Bot. Jahrb. **42**: 489. 1909.

Carchi: Cañon between San Gabriel and Bolivar, *Camp E-375*. Tungurahua: Along Río Pastaza just west of Baños, *Camp E-2367*. Cañar: North rim of the valley of the Río de Cañar, between Suscal and Chontamarca, *Camp E-2890* (coll. *M. Giler*). Valley of Río de Cañar at Abadel, below town of Galleturo, *Prieto CP-33*. Azuay: Numerous localities, *Camp E-411, E-553, E-1984, E-2178, E-3936, E-4495, E-4892, E-5013*. Loja: Cerro Villanaco (about 7 km. west of the city of Loja), *Camp E-186–E-196* incl., *E-682*. Nudo de Cajanuma, 7 km. south of Loja, *Camp E-114, E-115*. Crest of the Cordillera de Zamora, east of Loja, *Camp E-93, E-94, E-103*. Napo-Pastaza: Valley of the Río Pastaza and adjacent uplands, near El Topo, along trail to La Gloria, *Camp E-2400*. Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza, near mouth of Río Patos, *Camp E-754*.

The extensive suite of specimens cited above (without detailed notes on precise locality, habit, habitat, and color, since such notes are too abundant for inclusion here) demonstrates considerable variation, and yet I hardly see how it can be referred to more than a single species. The material is from shrubs up to 5 m. high, taken at elevations from 4,000 to 10,000 ft., and the corolla color is uniformly noted as red to crimson below, yellow or greenish yellow at apex. The most striking variations are seen in the indument of corolla and calyx, and in the density of glands on the calyx, pedicels, bracts, etc. The corolla, in particular, varies from copiously white-pilose with short spreading hairs to entirely glabrous. Of particular value is Dr. Camp's series numbered *E-186–E-196* inclusive, taken from plants in the same colony, demonstrating the instability of these characters.

In my treatment of 1932 (Contr. U. S. Nat. Herb. **28**: 489 et seq.) I expressed uncertainty as to the biological validity of several species of this alliance, and *C. hartwegiana* in that work was keyed with both the pubescent- and the glabrous-flowered species. It now seems quite impossible to maintain *C. hartwegiana* as distinct from *C. bracteata.* The accumulation of herbarium material in the past twenty years has furthermore served to weaken the supposed distinctions between *C. bracteata* and several other of its allies. One may question the advisability of maintaining such species as *C. beckmanniana* Hoer. (1909), *C. scabriuscula* (H. B. K.) Hoer. (based on *Thibaudia scabriuscula* H. B. K., 1818), and *C. miconioides* A. C. Smith (based on *Thibaudia melastomoides* H. B. K., 1818). The complex of which these entities are a part (whether as species or taxa of lesser rank) extends from Colombia to Bolivia.

It should also be considered whether the *C. bracteata* complex can be specifically kept apart from *C. strobilifera* (H. B. K.) Hoer. (based on *Thibaudia strobilifera* H. B. K., 1818), to which I have already reduced many comparatively recent specific concepts (i. e. to *C. acuminata*, op. cit. 503-505). Certainly I should now refer to *C. bracteata* several of the Ecuadorian collections which in 1932 I cited as *C. acuminata.*

The problems of relationships in this group of *Cavendishia* can probably not be solved without analysis in the field. In referring Dr. Camp's material to *C. bracteata* I make use of the oldest specific epithet for the complex.

Cavendishia strobilifera (H. B. K.) Hoer. Bot. Jahrb. 42: 279. 1909.

Pichincha: Western slope of the cordillera, along the road from Quito to Sto. Domingo de los Colorados, 7,000-10,000 ft. elev., *Camp E-1720* (abundant shrub 0.3-2.5 m.; bracts crimson; hypanthium red; corolla crimson except for pale yellow apex; ripe fruit purple-black, shining).

As implied above in my discussion of *C. bracteata* (R. & P.) Hoer., the differences between that and *C. strobilifera* are not very convincing. Since the character of corolla-pubescence is seen to be of little use, only the somewhat larger leaves with definitely long-acuminate apices serve to keep the present species apart.

Cavendishia capitata (Benth.) Hoer. Bot. Jahrb. 42: 279. 1909.

Loja: "Oriente" Border, crest of the Cordillera de Zamora, east of Loja, ca. 10,000 ft. elev., *Camp E-102* (growing in soil; spreading shrub to 2 m. high; bracts red; corolla white). Santiago-Zamora: Valley of the Río Zamora, east of Loja, ridge across river from village of Zamora, 6,500 ft. elev., *Camp E-42.* Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Tres Ranchos and Chontal, 2,700-5,700 ft. elev., *Camp E-1557* (great mounds of canes on bank, probably starting as windfall; leaves shining on both surfaces; bracts crimson; corolla white).

The cited specimens agree excellently with the type, from the Province of Loja. The collections discussed here represent the only additional material of the species known to me. The species is characterized by its essentially glabrous habit, comparatively large leaves and flowers, short pedicels with conspicuous bracteoles, glandular calyx-limb, and comparatively long glandular-margined calyx-lobes. The three cited collections permit some amplification of my earlier description (Contr. U. S. Nat. Herb. **28**: 507. 1932), as follows:

Leaf-blades (9-)12-19 cm. long, (3.5-)4.5-8.5 cm. broad, 7- or 9-nerved from near base but the outer 2 or 4 nerves often very inconspicuous; pedicels 2-5 mm. long, sometimes with a few scattered minute spherical glands, bibracteolate toward base, the bracteoles linear-oblong, obtuse, 4.5-6 × 1-1.5 mm., glandular-margined and sometimes glandular on both surfaces distally; calyx at anthesis up to 13 mm. long and 9 mm. in diameter at apex, the tube angled, up to 7 mm. long, the limb 3-6 mm. long, bearing superficial spherical glands without, the lobes 2.5-5 × 3-4 mm., glandular-margined, the sinuses rounded or obtuse; corolla

22–30 mm. long (as previously described), 4–7 mm. in diameter; filaments alternately 3.5–5 mm. and 6–8.5 mm. long, the anthers alternately 18–19 mm. and 15–17 mm. long, with thecae 5–7 mm. long.

The following three specimens should also be considered as representing *C. capitata,* although they are not strictly typical:

Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Hda. Chontal and Sta. Elena, 3,400–4,600 ft. elev., *Camp E-804* (NY only) (arching shrub, often seen epiphytic; bracts red; corolla pale pink, distally white). Cordillera Cutucú, ridge just south and west of Río Itzintza, 5,900 ft. elev., *Camp E-1347* (NY only) (on soil in moss; fruit black at maturity, insipid). Eastern slope and crest of main Cordillera Cutucú, 5,500 ft. elev., *Jorgensen CuJ-43* (shrub 3 m.; corolla red).

These specimens have the inflorescence precisely as in typical *C. capitata,* except that the pedicellary bracteoles are inclined to be slightly smaller (2.5–3.5 mm. long). The leaf-blades are comparatively narrow and lanceolate-oblong, 8–13 cm. long and 3–4 cm. broad, being sometimes only 5-nerved. These differences are so inconsequential that a reasonable species-concept for *C. capitata* may include all six specimens cited above.

Cavendishia campii A. C. Smith, sp. nov.

Frutex ad 4 m. altus, ramulis fuscis subteretibus apicem versus pilis albidis 0.2–0.5 mm. longis indutis demum glabratis; petiolis rugulosis 7–11 mm. longis ut ramulis pilosis; laminis coriaceis in sicco fusco-olivaceis oblongo-ellipticis, 8–17 cm. longis, 2.5–6 cm. latis, basi anguste rotundatis vel obtusis, in acuminem gracilem subacutum 1–2 cm. longum angustatis, margine recurvatis, supra glabris vel basim versus obscure pilosis, subtus pilis castaneis circiter 0.2 mm. longis e basi incrassato adpressis copiose strigillosis ac etiam secus nervos albido-hispidulis, 5(vel obscure 7-)-nerviis, nervis secundariis basi (raro ad 1 cm. concurrentibus) orientibus ut costa supra impressis subtus prominentibus, rete venularum supra plano subtus obscuro; inflorescentia axillari compacta plerumque 8–12-flora bracteis numerosis papyraceis glabris oblongis ad 2.5 cm. longis basi circumdata, bracteis extimis (minimis) dorso parce pilosis, rhachi crassa 0.5–2 cm. longa mox glabra; pedicellis rugulosis sub anthesi 4–9 mm. longis parce pilosis glabrescentibus, basim versus bibracteolatis, bracteolis lanceolato-oblongis subacutis circiter 4 mm. longis glabris vel obscure glanduloso-marginatis; calyce sub anthesi 6–9 mm. longo et apice 5–6 mm. diametro extus albido-piloso et interdum minute glanduloso, tubo oblongo obtuse angulato 4–5 mm. longo, limbo erecto 2–5 mm. longo 5-lobato, lobis deltoideis 1.5–3 × 2–3 mm. subacutis interdum glanduloso-marginatis, sinibus acutis vel obtusis; corolla tenuiter carnosa cylindrica sub anthesi 15–21 mm. longa et 4–5.5 mm. diametro praeter basim et apicem pilis 0.3–0.4 mm. longis patentibus ornata, lobis oblongis obtusis circiter 1 mm. longis; staminibus alternatim 13–14 mm. et 15–16 mm. longis, filamentis liberis gracilibus alternatim 2.5–3 mm. et 5–5.5 mm. longis superne pilosis, antheris alternatim circiter 12 mm. et 11 mm. longis, thecis 3–5 mm. longis; stylo corollam subaequante.

Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Hda. Chontal and Sta. Elena, 3,400–4,600 ft. elev., Nov. 1, 1944, *Camp E-803* (TYPE US 1,989,003; dupl. NY) (shrub 3 m.; bracts deep pink; corolla red), *Camp E-785* (NY only) (arching shrub 4 m.; bracts deep pink). Azuay: The eastern Cordillera, 1–8 km. north of the village of Sevilla de Oro, 8,000–9,000 ft. elev., *Camp E-4350* (coarse shrub, with branches to 4 m.; leaves deep green and nitid above, paler beneath; bracts pink; base of corolla pale pink, central portion deep pink to pale rose, apex white). Quebradas leading into the Río Collay, 3–8 km. north of Sevilla de Oro, 7,000–8,300 ft. elev., *Camp E-5007* (sprawling shrub 3 m.; leaves deep green above, pale beneath, subnitid on both surfaces; bracts pale pink; corolla basally pink, apically white).

In my key to the genus (Contr. U. S. Nat. Herb. **28**: 463–467. 1932) this species would be sought in the vicinity of *C. pubescens* (H. B. K.) Hemsl., from which it differs in its less copious indument, generally smaller leaves, more compact inflorescence, and smaller flowers with less conspicuous calyx-lobes. However, the new species is probably more closely allied to *C. capitata* (Benth.) Hoer., discussed above. From the typical form of *C. capitata, C. campii* differs in the pubescence of its vegetative parts and flowers, its prevailingly smaller leaves, longer pedicels with smaller bracteoles, eglandular (or sparsely glandular) calyx, and distinctly shorter corolla and stamens. Variability in pubescence is marked in some species of *Cavendishia* (see discussion of *C. bracteata*, above), but the combination of characters marking *C. campii* seems reasonably adequate, although admittedly specific lines in this group of *Cavendishia* are somewhat arbitrary and in need of field analysis. Another species of this alliance, the Peruvian *C. ulei* Hoer., has its leaf-blades distinctly 7-nerved and with comparatively highly concurrent nerves, and lacks the characteristic white pubescence of *C. campii.*

Cavendishia zamorensis A. C. Smith, sp. nov.

Frutex epiphyticus, ramulis crassis glabris in sicco pallidis striatis; petiolis subteretibus rugulosis glabris 5–10 mm. longis; laminis subcoriaceis siccitate metallico-olivaceis ellipticis, 11–15 cm. longis, 5–9 cm. latis, basi rotundatis, in acuminem subacutum ad 15 mm. longum subito angustatis, margine recurvatis, supra glabris, subtus minute glanduloso-strigillosis, 7(vel obscure 9-)-nerviis, nervis (intimis interdum ad 2 cm. cum costa concurrentibus) et costa supra impressis (vel basim versus elevatis) subtus prominentibus, rete venularum utrinque haud prominulo; inflorescentia apices ramulorum versus axillari subcapitata, ubique praeter filamentas glabra, bracteis papyraceis suborbicularibus rotundatis margine scariosis maximis ad 2 cm. diametro basi circumdata, rhachi brevi, floribus numerosis congestis; pedicellis incrassatis sub anthesi 2–3 mm. longis parce glandulosis basim versus bibracteolatis, bracteolis submembranaceis oblongo-ellipticis 5–6 mm. longis circiter 4 mm. latis apice rotundatis utrinque parce glanduloso-strigillosis tubum calycis involventibus; calyce sub anthesi circiter 10 mm. longo et apice diametro, tubo obtuse angulato circiter 3 mm. longo, limbo erecto-patente quam tubo longiore superne parce glanduloso-strigilloso profunde 5-lobato, lobis elliptico-oblongis basi imbricatis 6–7 mm. longis 4–5 mm. latis apice rotundatis margine scariosis et pauci-glandulosis; corolla carnosa urceolato-cylindrica sub anthesi 13–14 mm. longa et circiter 7 mm. diametro, superne angustata, lobis deltoideis obtusis circiter 1 mm. longis; staminibus circiter 11 mm. longis, filamentis ligulatis alternatim circiter 2 mm. et 3.5 mm. longis superne intus obscure pilosis, antheris alternatim circiter 11 mm. et 10 mm. longis, thecis 4–5 mm. longis; stylo tereti corollam subaequante, stigmate minuto.

Santiago-Zamora: Valley of the Río Zamora, east of Loja, near Zamora, about 3,000 ft. elev., June 28–July 1, 1944, *Camp E-2* (TYPE US 1,988,931; dupl. NY) (epiphyte on trees over river; bracts deep pink to crimson; corolla white).

In its imbricate calyx-lobes, *C. zamorensis* suggests a relationship with such Colombian species as the recently described *C. tenella* A. C. Smith (Jour. Arnold Arb. **27**: 106. 1946), from which it differs in its short-petiolate leaves with rounded bases, compact and comparatively few-flowered inflorescences, large pedicellary bracteoles, and slightly larger flowers. A specimen which may best be referred to the new species, but the variations of which are not included in the above description, is *Camp E-29* (NY only) (same locality as type, ridge across the river from the village of Zamora, 6,500 ft. elev.; epiphytic shrub with branches to 3 m.; bracts deep pink; flowers pale pink). From the type this specimen differs in having the pedicellary bracteoles only 1.5 mm. broad and consequently not clasping the calyx, the calyx-lobes only 2.5-3 mm. broad, very narrowly imbricate, and more copiously glandular at margin, the corolla 19-22 mm. long, the stamens about 15 mm. long, with filaments alternately about 2.5 mm. and 5 mm. long and stamens about 13 mm. and 11 mm. long respectively. This variant seems to point toward a relationship of *C. zamorensis* with *C. capitata*, which occurs more commonly in the area, as noted above. The type of the new species, at least, seems to represent an entity worthy of specific rank, differing from typical *C. capitata* in its broad bracteoles and calyx-lobes and its short corolla and stamens.

Cavendishia orthosepala A. C. Smith, sp. nov.

Frutex epiphyticus, ramulis subteretibus pilis albidis circiter 0.5 mm. longis patentibus indutis demum glabratis; petiolis validis teretibus 7-13 mm. longis ut ramulis pilosis; laminis subcoriaceis plus minusve bullatis in sicco fusco-metallicis oblongo-ellipticis, (11-)15-26 cm. longis, (3-)4-9 cm. latis, basi rotundatis vel late obtusis, in acuminem subacutum 10-15 mm. longum subito angustatis, margine valde recurvatis, supra primo pilosis, subtus ut ramulis copiose albido-pilosis ac etiam pilis castaneis glandulosis circiter 0.2 mm. longis a basi incrassato adpressis strigillosis, plerumque 7-nerviis, nervis (intimis ad 3 cm. cum costa concurrentibus) et costa supra conspicue impressis subtus prominentibus, venulis utrinque subprominulis; inflorescentia subterminali breviter racemosa multiflora, bracteis papyraceis obovato-oblongis rotundatis margine scariosis maximis circiter 25 mm. longis basi circumdata, bracteis extimis (minimis) dorso pilosis ceteris glabris, rhachi post anthesin ad 3 cm. longa glabra; pedicellis incrassatis teretibus obscure glanduloso-strigillosis 3-5 mm. longis basi conspicue bibracteolatis, bracteolis papyraceis obovato-ellipticis 12-16 mm. longis 3-6.5 mm. latis apice rotundatis vel emarginatis et parce glandulosis margine scariosis dorso glanduloso-strigillosis tubum calycis involventibus; calyce post anthesin 15-17 mm. longo extus pilis albidis 0.4-0.7 mm. longis copiose induto, tubo cupuliformi circiter 5 mm. longo et diametro, limbo erecto fere ad basim profunde 5-lobato, lobis subcoriaceis anguste oblongis 10-12 mm. longis 2-3 mm. latis basi anguste imbricatis apice subacutis intus glabris glanduloso-strigillosis; corolla filamentisque non visis, antheris circiter 10 mm. longis, tubulis thecas longitudine subaequantibus; stylo filiformi circiter 16 mm. longo, stigmate minuto.

Santiago-Zamora: Cordillera Cutucú, on banks of Río Itzintza, 3,500 ft. elev., Nov. 17-Dec. 5, 1944, *Camp E-1201* (TYPE US 1,989,011; dupl. NY) (epiphyte; leaves deep green and shining above, paler and dull beneath; inflorescence up to 24-flowered; outer bracts deep red, the inner bracts pink to red; fruit white). Same locality, ridge between Ríos Itzintza and Chupiasa, 4,000-4,500 ft. elev., *Camp E-1278* (vine-like epiphyte, in tree thrown by storm; leaves deep green above, paler beneath, with markedly translucent veins; bracts crimson; hypanthium turning cream-white, the calyx-lobes crimson).

The remarkably developed pedicellary bracteoles and calyx-lobes of the new species are so unique in *Cavendishia* that comparisons with other species are superfluous. A tendency in this direction is noted in the above described *C. zamorensis*, which differs from *C. orthosepala* in the lesser development of these parts and in obvious characters of pubescence, but which may be its closest relative. The new species suggests *C. pubescens* (H. B. K.) Hemsl. in foliage, but inflorescence differences are numerous and obvious. No corollas are available for the new species, but dimensions of the style and a few anthers (with no. *1278*) indicate a corolla about 16 mm. long.

Cavendishia sp.

Santiago-Zamora: Cordillera Cutucú, ridge ascending into central Cutucú, 4,400–4,700 ft. elev., *Camp E-1157* (NY only) (epiphyte, arching to 2 m.; calyx fluted and ribbed; corolla pale, tipped with crimson).

The cited plant appears to represent an undescribed species, but unfortunately the corollas described in the field notes are not now with the unicate specimen. Its relationship is with the species of *Cavendishia* with an elongate calyx-limb and callose-thickened lobes (see sp. 5–9 in my key in Contr. U. S. Nat. Herb. **28**: 463. 1932).

Orthaea secundiflora (Poepp. & Endl.) Kl. Linnaea **24**: 24. 1851.

Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Hda. Chontal and Sta. Elena, 3,400–4,600 ft. elev., *Camp E-783* (coarse epiphyte, hanging lax to 6 m.; new leaves bright pink, conspicuous in the forest; corolla deep crimson, in bud pale pink, apically white); same locality, *Camp E-799* (arching shrub 4 m.; corolla crimson below, apically white).

These collections, the first of the species recorded from Ecuador, agree excellently with the original description and plate (*Thibaudia secundiflora* Poepp. & Endl. Nov. Gen. & Sp. **1**: 5. *pl.* 9. 1835). The type material of the species was obtained in the present Department of Huánuco, Peru.

Orthaea sp.

Santiago-Zamora: Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), region of Tambo Pilas, near mouth of Río Patos, 6,500–7,500 ft. elev., *Camp E-757* (shrub 4 m.; leaves shining on both sides, somewhat paler beneath; corolla pale pink below, apically white).

The cited specimen differs from *O. secundiflora* in its congested inflorescences (rachis 5–8 mm. long; pedicels about the same length), and its stamens with free filaments and slightly shorter anthers. It may be referable to *O. abbreviata* Drake, from southern Ecuador, but the inadequate description of that species (Jour. de Bot. 3: 75. 1889) implies that its leaves are somewhat broader (7 × 3 cm.) and its pedicels are 2 cm. long. Number 757 cannot be positively identified without comparison with the type of *O. abbreviata*.

Satyria panurensis (Benth.) Benth. & Hook. Gen. Pl. 2: 568. 1876.

Santiago-Zamora: Low hills west of Río Upano, along Río Chupiangias, 2,500–3,200 ft. elev., *F. Prieto ChuP-24* (epiphytic, vinelike; young leaves red; corolla red, green at apex).

Widespread in the Andean foothills from Peru to Venezuela and into British Guiana, but not, so far as I know, previously recorded from Ecuador.

Satyria leucostoma Sleumer, Bot. Jahrb. 71: 407. 1941.

Santiago-Zamora: Cordillera Cutucú, ridge ascending into central Cutucú, 4,400–4,700 ft. elev., *Camp E-1146* (climbing, or high epiphyte; pedicels and hypanthium green; base of corolla crimson, the apex white; leaves dull beneath). Eastern slope of the cordillera, valley of the Ríos Negro and Chupianza (on the trail from Sevilla de Oro to Mendez), between Tres Ranchos and Chontal, 2,700–5,700 ft. elev., *Camp E-1558* (epiphyte; leaves deep green above, pale beneath; pedicels and hypanthium green; base of corolla red, the apex white).

Although type material of Sleumer's species is not available, the cited specimens agree excellently with the original description, based on *Schultze-Rhonhof 3010*, also collected in the Oriente of Ecuador. Some of the leaf-blades of the Camp material, probably from older parts of the plant, attain dimensions of 30 × 9 cm.; the corollas are 8.5–9.5 mm. long, and the anthers (slightly larger than those of the type) are alternately 3.5–4.5 mm. and 4–5 mm. long.

DEPARTMENT OF BOTANY, U. S. NATIONAL MUSEUM
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THE BOTANY OF THE GUAYANA HIGHLAND

A Report of the Kunhardt, the Phelps, and the New York Botanical Garden Venezuelan Expeditions

BASSETT MAGUIRE, RICHARD S. COWAN AND
JOHN J. WURDACK, AND COLLABORATORS

INTRODUCTION

Seldom do richness of natural history and delightful fantasy of fabulous legend and classic literature so combine to lure attention as they do in the ancient region of Guayana.

Barely ten years after Columbus' discovery of the New World, tales were told in maritime Europe of incredible men and practices in what was soon to be called Guayana; of headless savages, war-waging women, and frightful arrow- and dart-poison (curare). The myth of the Mar del Dorado somewhere in the remote interior where the Indians covered themselves with dust of gold gained wide currency in Europe. Raleigh a hundred years later led four expeditions into the mouth of the Orinoco in quest of empire and in search of the gold of Dorado.

Another two hundred years had passed before von Humboldt had skirted the northern and western periphery of Guayana. And it was not until 1838-39 that Robert Schomburgk traversed the wild region from east to west by foot and canoe, giving meaning to the geography of Guayana, and finally quieting the stories of the gold of El Dorado.

But Indian legend and mythology continued to flourish. Such stories against the backdrop of fantastic grandeur of landscape, in the light of newly rising consciousness of the existence of an extraordinary flora and fauna on the isolated mountain fastnesses, lent themselves to the beautiful writings of William H. Hudson and the imaginative classic of Conan Doyle.

Actual facts of physical history and diversity and extraordinary endemism among the biota of the isolated and lofty sandstone plateaus are found to be hardly less spectacular than precursor fable and fantasy. It was these attractions, largely revealed by the discoveries and writings of the Schomburgk brothers, that during the latter part of the nineteenth century drew European biologists to Mt. Roraima, the "Lost World" of Doyle. It is still that inexhaustible treasure-house of natural history that continues to draw to the Guayana Highland naturalists from the Americas and Europe, particularly from Venezuela and the United States. Since 1925 continued exploration into still little known Guayana has been carried on chiefly by Venezuelan naturalists, notably the Phelps, father and son, distinguished ornithologists; by Captain Felix Cardona, explorer-extraordinary for the Venezuelan Government; by English botanists in the Kaieteur region; and by the cooperative efforts of the Servicio Botânico, Caracas, the American Museum of Natural History, the American Geographical Society, the British Guiana Forest Department, and the New York Botanical Garden. These reports detail the results of the continued exploration of the New York Botanical Garden and associated institutions and agencies, and may be considered preliminary to a floristic treatment of the phytogeographic province, the Guayana Highland.

There follows in this introduction a brief statement of the pertinent botanical history of the region. Any consideration of geology and geography, and any interpretation of phytogeography and ecology of the flora may more successfully be made at the conclusion of the continuing program of exploration and the completion of the review of collected material.

History of Botanical Exploration. Active exploration of the Guayana Highland began with the extraordinary travels (mostly confined to British Guiana) of the famous brothers, Robert Herman and Richard Schomburgk.

Robert Schomburgk's remarkable journey of exploration in the Guayana Highland started on September 20, 1838, on his departure from the Brazilian garrison, Fort São Joaquim, at the junction of the Takutu and Parima where together they form the Rio Branco. Under a commission of the Geographical Society of London Schomburgk was to proceed westward overland, finally to reach the Orinoco River, and thus supplement with his own the observations of von Humboldt made along the Orinoco more than thirty-five years earlier.

It was to be seven months and two days before Schomburgk again reached Fort São Joaquim. He had become the first botanist to visit the fabulous Mount Roraima. In his further westward progress he had crossed and recrossed the low Pacaraima Divide separating the drainages of the Orinoco to the north and the Amazon to the south; he visited the remote Cerro Marahuaca and its more westerly neighbor Cerro Duida on the Orinoco. And, after having passed through the Casiquiare, linking the waterways of the Orinoco with the Amazon, finally by way of the Rio Negro and Rio Branco he completed his "circular tour of 2200 miles"![1] This certainly is one of the great explorations of all time.

Again in 1842 Robert Schomburgk returned to Mt. Roraima, this time with a party including his younger brother Richard. This expedition set out on the morning of September 10, 1842,[2] from the granitic Kanuku Mountains in west-central British Guiana. At the Ireng River, only some 20 miles from Pirara, the party reached the Brazilian frontier, and from the junction of the Ireng with the Takutu, a few miles below, were wholly out of British Guiana until the return to that point before arriving again at Pirara on the following December 28th.

The plant (and animal) specimens collected on this important exploration were, as a consequence, taken from either Brazilian or Venezuelan soil, except those that may have been obtained by Robert after he, independently, had crossed the present Venamo-Roraima boundary line from Venezuela into the British Guiana drainage of the Kamarang River.

The title of Schomburgk's journal, "Travels in British Guiana," does not indicate extra-British Guiana excursion. Locality on collection labels is indicated by the vague designations "British Guiana" or "Roraima"; however, in the narrative (op. cit. pp. 118–277) itinerary and locality were plainly given. The Schomburgks had known fairly accurately where they had been since they were observers of much of the border disturbances of the time, and Robert himself had been a member of the Boundary Commission.

Since the excursions of the Schomburgk brothers, Roraima has attracted numerous explorations. Burkill recounts the history of botanical exploration of the mountain up to 1900 in the important "Report on two Botanical Collections Made by Messrs. F. V. McConnell and J. J. Quelch at Mount Roraima in British Guiana."[3] The following is taken largely from Burkill's account.

Karl Appun visited the mountain in 1864 (Burkill's account p. 2) where he reached the base of the cliff on the east and south side. Im Thurn and Perkins (p. 3) were the first to ascend the mountain to the summit, but were forced to return to their base camp at 5400 feet after a distressingly short stay of three hours.

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[1] Schomburgk, R. H. Travels in Guiana and on the Orinoco, 1841. English translation by Walter E. Roth, Georgetown, 1931.

[2] Schomburgk, Richard. Travels in British Guiana 2: 118. 1848. English translation by Walter E. Roth, Georgetown, 1923.

[3] Brown, N. E. et al. Trans. Linn. Soc. II. 6: 1–107. *pl. 1–14.* 1901.

McConnell and Quelch twice visited Roraima, in 1894 and again in 1898, both times reaching the summit, where a total of 12 days were spent making animal and plant collections. They had crossed the Ireng at Karona Falls into Brazil from British Guiana. Roraima was approached from the south up the valley of the Arabapo in Venezuela, and ascended by way of the Kukenam drainage in Venezuela along the southwest face of the mountain. Their extensive collections form the basis for the report by N. E. Brown which remains today the most important single contribution to the botany of Roraima. Unfortunately, although locality is given in the citation of specimens, by indirection from the title of the work one is led to consider that the collections were made in British Guiana, whereas in fact the great bulk was made in Venezuela and a lesser amount in Brazil.

Gleason[4] has reported that "E. Ule spent several weeks on the slopes of the mountain [Roraima] in December 1909 and January 1910, and made four ascents to its summit." but that (Gleason p. 406) "no summary has been made of the number of species collected by Ule."

Contemporary botanical study of Roraima began with the Lee Garnett Day—American Museum of Natural History Expedition led by G. H. H. Tate of the American Museum. Roraima was approached by the way of the Amazon and Rio Branco, and ascended by the then well established trail up the southwestern face. Collections on Roraima and its approaches were made from October 27, 1927, to January 9, 1928.

Although the primary purpose was the study and collection of the fauna of the mountain, Dr. Tate found time also to make 515 collections of plants. These were deposited at the New York Botanical Garden, where they were studied and reported on by H. A. Gleason.[5]

Albert S. Pinkus and P. S. Perberdy in 1938-39 visited Roraima by way of the Mazaruni River, British Guiana. Their collections of plants, representing some 292 numbers (collected and prepared almost entirely by their Arawak Indian assistant, Rufus Boyan), were studied and distributed by the New York Botanical Garden, where the first set is deposited. Sixteen new species were described from the Pinkus materials.

No further plant collections of significance were made on Roraima until 1945 when Julian A. Steyermark visited the mountain. Dr. Steyermark's first set is at the Chicago Museum of Natural History; duplicate sets are at the New York Botanical Garden, the United States National Herbarium, and elsewhere.

In earlier reports, precise geographical designation may not have been considered significant in comparison to the overriding importance of initial exploration and investigation, since in the literature most of the collections of this region have been loosely assigned to British Guiana, whereas in point of fact most of these early collections are from Venezuela and Brazil. While many of the species involved may and probably actually do occur within the political limits of British Guiana, in great part there exists no actual record of them for that British colony. Even as late as 1929, Gleason (p. 393) in his report on the Tate collection, wrote: "The small area on the summit of Mount Roraima is shared by Brazil, Venezuela, and British Guiana, and the dividing line between them has not been accurately located. All specimens in this article from the summit and slopes of the mountain have been credited to British Guiana as a matter of convenience."

Phelps[6] has discussed a similar confusion of geography as related to birds collected on various expeditions to Roraima, on which the birds were taken wholly within Venezuela but for the most part recorded as from British Guiana. He has pointed out that as delimited by natural watershed and boundary commission findings, more than five-eighths, the western and southern portion of the summit (and that part traversed by various expeditions) is Venezuelan, less than one-fourth, the northeastern part (which is designated largely "inaccessible" on the Commission map), is British Guianan, and a very small portion, about one-eighth, on the southeastern portion Brazilian.

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[4] Bull. Torrey Club 56: 391. 1929.

[5] Bull. Torrey Club 56: 339-390. 1929.

[6] Phelps, William H. The geographical status of the birds collected at Mount Roraima, Bol. Soc. Venez. Ci. Nat. 83-95. 1939. reprint, Caracas, 1939.

Further botanical exploration of the Guayana Highland has been made without confusion of geography.

For more than the past two decades the colleagues of Professor Henri Pittier, namely Captain Felix Cardona, Doctors Tobias Lasser, Francisco Tamayo, and others, have visited the Gran Sabana. The major collections of all of them are in the Venezuelan National Herbarium.

Over the period October 1, 1928 to March 18, 1929, the Sidney F. Tyler–American Museum of Natural History Expedition was led by Dr. Tate[7] in the first ascent of Cerro Duida, on the western margin of the Guayana Highland. Tate's important collections were deposited at the New York Botanical Garden, and became the basis of the voluminous and important "Botanical results of the Tyler-Duida Expedition" by Gleason.[8]

Stimulated by the explorations of Roraima and Duida, The American Museum of Natural History, the American Geographical Society, and the New York Botanical Garden completed preliminary organization of an ambitious plan for the further over-all biological, geological, and geographical survey of the Guayana Highland. An outline entitled "Prospectus of the Pacaraima-Venezuela Expedition" was issued, detailing proposed objectives for the cooperative undertaking. Unfortunately, these well-balanced plans did not reach fruition. The American Museum was, however, able independently to carry out a comparable exploration under the sponsorship of Dr. William H. Phelps of Caracas.

Tate[9] led the important William H. Phelps–American Museum of Natural History Expedition of Auyán-tepuí, near the Río Caroní in the northeastern part of the Gran Sabana. Tate's invaluable plant collections from the region for the third time came to the New York Botanical Garden. Report on them was made by Gleason and Killip.[10]

In the meanwhile, George S. Jenman, from 1903 to 1929 Government Botanist and Superintendent of the Botanic Garden, Georgetown, conducted extensive exploration in British Guiana and collected on the Kaieteur Escarpment about Kaieteur Falls, on the Potaro River, which Im Thurn had visited in 1884. R. A. Alston, who was Assistant Government Botanist and Mycologist in British Guiana during 1923–1927, made two excursions into eastern Guayana. During August and September of 1925, he collected at Macreba Falls on the Kurupung River, where it drops from the sandstone plateau, and on the plateau itself along the Membaru trail. Collections made here represent some 130 numbers. In March, April, and May of 1926 Alston made an expedition up the Potaro River across the Kaieteur Plateau to the Ireng River. This trip netted about 98 collections. Both are chiefly deposited in the Jenman Herbarium, Georgetown, and at Kew. H. A. Gleason made numerous important collections in the Potaro River Gorge in 1924. (Maguire visited the magnificent Kaieteur Falls and exciting Kaieteur Escarpment as a student of zoology in 1925.)

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[7] Tate, G. H. H. & Hitchcock, C. B. Geogr. Rev. 20: 31–52. 1930.

[8] Bull. Torrey Club 58: 277–506. 1931.

[9] Geogr. Rev. 28: 452–473. 1938.

[10] Brittonia 3: 141–204. 1939.

Cambridge University sent an expedition to the Kaieteur Savanna in 1933. T. G. Tutin has reported[11] on the botanical results in which sixteen new species were proposed. N. Y. Sandwith, botanist on the Oxford University Club Expedition to British Guiana in 1929, later visited the Kaieteur Savanna in August and September of 1937. Many new species and records have come from his collections.

In continuation of its program of research on the botany of the Guayana Highland, the New York Botanical Garden organized an expedition to the Kaieteur Escarpment in 1944. Some twenty days were spent in this famous collecting area by Bassett Maguire in the company and under the guidance of D. B. Fanshawe, British Forest Officer. Later that same year, Maguire[12] proceeded with the exploration of Tafelberg in central Surinam, the easternmost sandstone table mountain outlier of the Guayana Highland. The botanical results of the British Guiana field work (April 13–May 23, 1944) and the Tafelberg Expedition (June 12–October 13, 1944) in Surinam have been published in a series of papers by him[13] in conjunction with numerous collaborators.

During 1944 and 1945 Julian A. Steyermark collected extensively in Ecuador and Venezuela. In the Guayana Highland he visited Duida and Roraima, and during the same period made the first botanical collections from Ptarí-tepuí in the State of Bolívar. Steyermark's numerous collections form the basis of his important contributions[14] to the flora of Venezuela, of which part 1 is at this writing already published.

After the major expedition to Auyán-tepuí, William H. Phelps and William H. Phelps, Jr. continued their thorough program in the study and collection of the avifauna of Venezuela. Recent active field work in Guayana has largely been carried on by Mr. and Mrs. William H. Phelps, Jr. They have conducted a series of explorations of the sandstone tepuís of the Gran Sabana and Territorio Amazonas, beginning with a visit to Mount Roraima, continuing successively with expeditions to Uaipán-tepuí, Chimantá-tepuí, Guaiquinima, Sipapo (Paráque), Yaví,[15] Parú, and most recently with the ascent of Guanay and Camani in 1951.

Mrs. Phelps (Kathleen D. Phelps) has been the botanist of these expeditions, and, often with the assistance of Charles B. Hitchcock, has made invaluable contributions to the botany of the Highland. The botanical materials of these expeditions are at the New York Botanical Garden, where collaborative studies and publication on them are under way.[16]

Mrs. Phelps joined the staff of the New York Botanical Garden in 1950 as Collaborator in Venezuelan Botany. As a result, the first of the joint studies, an initial report on the plants of Uaipán-tepuí, is at this writing in the hands of the editors.[17]

In January and February of this year (1951) Charles B. Hitchcock, Gerald Budowski and Bassett Maguire had the pleasure of accompanying Mr. and Mrs. Phelps on their exploration of Cerros Guanay and Camani in the headwaters of the

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[11] Jour. Bot. 72: 306–314. *f. 1–5.* N 1934; 333–341. *f. 6–11.* D 1934.

[12] Geogr. Rev. 35: 563–579. 1945.

[13] Maguire, Bassett and Collaborators. Plant explorations in Guiana in 1944, chiefly to the Tafelberg and the Kaieteur Plateau. Bull. Torrey Club 75: 56–115, 182–230, 286–323, 374–438, 523–580, 633–671. 1948.

[14] Steyermark, Julian A. and Collaborators. Contributions to the flora of Venezuela. Fieldiana Bot. 28: 1–242. 1951.

[15] For a narrative of the Cerro Yaví expedition, see: Charles B. Hitchcock. The Orinoco-Ventuari Region, Venezuela. Geogr. Rev. 37: 525–566. 1947.

[16] Lasser, T. & Bassett Maguire. A Report on the Plants of the Phelps' Cerro Yaví Expedition of 1947. Brittonia 7: 75–90. 1950.

[17] Maguire, Bassett & Phelps, Kathleen D. Botany of the Phelps' Venezuelan Guayana Expedition—II. Uaipán-tepuí, Estado Bolivar. Bol. Soc. Venez. Ci. Nat. [in press.]

Ríos Manapiare-Guaviarito, Territorio Amazonas. The first part of our report on the plants of these two sandstone mountains likewise is in the hands of the editors.[18]

Upon the completion of the Kaieteur and Tafelberg report, the New York Botanical Garden resumed its program of field excursions into the Guayana Highland. The first H. R. Kunhardt–New York Botanical Garden Expedition was conducted by Bassett Maguire, Louis Politi, and Bassett Maguire, Jr. to Cerro Sipapo (Paráque) in the Río Cuao, tributary of the Upper Orinoco in Amazonas. Nearly three months were spent on its summit from October 1948 to February 1949.

Immediately succeeding the first, the second Kunhardt–New York Botanical Garden Expedition was sent specifically in search of *Arundinaria schomburgkii,* which had not been recollected since its original discovery in 1839 by Robert Schomburgk on the southeastern tip of Cerro Marahuaca. Maguire and Maguire approached Marahuaca by way of the Cunucunuma, headwater stream of the Orinoco. On the way, three days were spent on the north summit of Cerro Duida. On May 9, 1949 a large community of *Arundinaria,* the famous *curata* from which the Maquiritare Indians make their blow-guns, was found along the base of Marahuaca's enormous escarpment, high at 5500 feet altitude in the cloud forest of the southeast talus slope.

In 1950 the New York Botanical Garden Expedition returned to Amazonas. Maguire, with Richard S. Cowan and John J. Wurdack, again spent eight days on the north summit of Duida, from November 18 to November 25. Tate and Hitchcock had, from the South Escarpment, penetrated the mountain northward into the large central valley drained by Caño Negro. The 1950 expedition worked southward from its camp near the North Escarpment to the north ridges of Caño Negro.

To the north of Duida, fifteen miles across the forested valley of the Río Cunucunuma, is the completely escarpment-ringed Cerro Huachamacari, the "House of the Maquiritare Gods," rising some 6500 feet above the valley floor. A tangential ledge (somewhat similar to that on the face of Roraima's cliffs) traversing the 1500 foot South Escarpment, culminating in a 150 foot vertical erosion chimney, provided a means of ascent. Thirteen days, from December 6 to December 18, were spent on the summit.

Closely successive explorations were then made to the summits of Cerro Yapacana on the Orinoco (December 31 to January 6) and Cerro Moriche on the Ventuari (January 12 to January 21).

Cowan and Wurdack extended the expedition of the New York Botanical Garden to the further exploration of the enormous Serranía Parú from January 31 to February 17, 1951. The party succeeded in reaching the summit repeatedly, the northern segment, Cerro Parú, which is separated from the greater portion of the plateau-mountain by a deep canyon.

From September 1947 through July 1948 Richard E. Schultes carried on exploration in the Upper Rio Negro drainage of Brazil and Colombia. On further extended exploration, he is in the same general region at the present writing. Schultes in large measure has retraced the routes of Richard Spruce, recollecting much of the Spruce materials and adding much new material of his own. In the course of his explorations, Schultes had the opportunity to visit the Cerros Campana and Chiribiquete, neighboring sandstone mountains, both under 3000 feet in elevation, on the upper Apaporis in Vaupés, Colombia. The botanical results are being published by the explorer in a series of reports under the title "Plantae austroamericana."[19]

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[18] Maguire, Bassett & Phelps, Kathleen D. Botany of the Phelps' Venezuelan Guayana Expedition—I. Territorio Amazonas. Bol. Soc. Venez. Ci. Nat. [in press.]

Along the eastern foothills of the Cordillera Oriental in Colombia is the extensive Serranía Macarena, an enormous sandstone massif, possibly to be associated geologically with the sandstone mountains of Guayana. Only recently it has been the object of a British Museum-Colombian Expedition, the results of which are as yet unpublished. W. R. Philipson, of the British Museum, was leader of botanical exploration.

During the fall and winter of 1951-1952,[20] the New York Botanical Garden will conduct expeditions to Cerro Guaiquinima in the State of Bolívar, in Venezuela, and with the British Forest Department to the northeastern portion of the Pacaraima Mountains in British Guiana. During the 1952-1953 season, the New York Botanical Garden plans to complete this twenty-five year program in the exploration of Cerro Chimantá-tepuí and outliers in the Gran Sabana. The further sustained field operation of the Servicio Botánico and the continuing exploration by Mr. and Mrs. Phelps may be expected to augment the collected materials and general knowledge of the region for a long time to come.

It is hoped that the material and data so gained will have become sufficient for a preliminary floristic treatment of the Guayana Highland.

Localities, collectors, dates, and exsiccatae numbers of the 1948-51 Venezuelan expeditions

States of Anzoategui and Monagas.

Bassett Maguire, H. R. Kunhardt, Louis Politi, October 21-November 4, 1948: 27207-27304.

Cerro Sipapo (Paráque), Territorio Amazonas.

Bassett Maguire, Louis Politi, Bassett Maguire, Jr. (after January 1), November 15, 1948-March 15, 1949: 27318-29039.

Cerro Duida, Cerro Marahuaca, Territorio Amazonas.

Bassett Maguire and Bassett Maguire, Jr., April 18, 1949-May 21, 1949: 29040-29221.

Río Atabapo, Territorio Amazonas.

Bassett Maguire, October 17-October 26, 1950: 29222-29345.

Cerros Duida, Huachamacari, Yapacana, and Moriche, Territorio Amazonas.

Bassett Maguire, Richard S. Cowan and John J. Wurdack, November 2, 1950-January 21, 1951: 29346-31057.

Cerro Parú, Territorio Amazonas.

Richard S. Cowan and John J. Wurdack, January 31, 1951-February 21, 1951: 31058-31599.

Acknowledgements. Acknowledgement of assistance and services is always a pleasant duty, but is regrettably one that never succeeds fully in meeting its genuine obligation to the many who contribute so much to successful exploration.

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[19] Bot. Mus. Leafl. 15: 29-78. 1951. et praec.

[20] Since this paper has been written, the 1951-1952 expeditions have returned to New York after having completed the explorations noted above, viz. the visits to Guaiquinima, and to the British Guiana-Pacaraima region. In addition Mr. and Mrs. William H. Phelps, Jr. have sponsored an excursion, conducted by Bassett Maguire, to Ilú-tepuí, the northernmost of the Mt. Roraima chain along the Venezuelan-British Guiana boundary. The botanical results of these latest expeditions will be reported in the course of the publications of this series of papers.

To all, those directly mentioned and to many more unspecified contributors, we offer sincere and grateful acknowledgment.

The prosecution of these explorations would not have been possible but for the facility lent by the many officials of the Government of Venezuela and the United States Department of State. Particular appreciation should be expressed to their Excellencies, the Ministers of Agriculture and Forestry, and of Information, to their Excellencies, Coroneles Paoli and Calcaño, Governors of the Territorio Amazonas, to Dr. Tobias Lasser, Chief of the Botanical Service and Director of the Venezuelan National Herbarium, to Dr. A. Davila-Delgado, formerly Venezuelan Consul-General in New York, now Minister to Belgium, and to Dr. James H. Kempton, Agricultural Attaché to the American Embassy in Caracas.

Mr. H. R. Kunhardt, chairman of the New York Botanical Garden Exploration Committee, retired president of the Venezuelan Petroleum Company, organized and sponsored the Kunhardt Expeditions to Cerros Sipapo, Duida, and Marahuaca. A major part of the following report derives from the collections of the Kunhardt Expeditions.

Dr. William H. Phelps, who sponsored the Phelps Auyán-tepuí Expedition and Mr. William H. Phelps, Jr., both eminent ornithologists of Venezuela, continue to assist in the further program of exploration. Mrs. Phelps, Collaborator in Venezuelan Botany at the New York Botanical Garden, together with Mr. Charles B. Hitchcock, Secretary of the American Geographical Society, contributed in numerous ways to the botanical survey of Guayana. All have shared their rich experiences in exploration technique, supplied trained assistants, conducted independent and important plant field work, and have been ever generous hosts in Caracas and on their own effectively operated expeditions.

In Ciudad Bolívar, Puerto Ayacucho, and San Fernando, numerous officials and friends have eased and simplified final organization at these interior river staging ports. Particularly in San Fernando Mr. William Northrup and Mr. Robert Shaylor have assisted in generous hospitality and use of boats and outboard motors. I shall ever be grateful to Mrs. Northrup who expertly nursed my son back to health after a severe attack of malaria and dysentery.

Through officials of the Sinclair Oil and Refining Company, chiefly Mr. H. R. Kunhardt, Mr. E. T. Lincoln, Miss Julia Baumann, Mr. L. J. Maurovich, Mr. Adolph Michaelson, and Mr. George McKnight, ship passage to Venezuela has been pro-

FIG. 1. Map showing the approximate location and distribution of sandstone mountains or plateaus that have been the subject of past exploration, or are the object of future explorations anticipated by The New York Botanical Garden.

Surinam
  1. Tafelberg
British Guiana
  2. Kaieteur Plateau
Venezuela, Estado Bolívar
  3. Mt. Roraima
  *Ilú-tepuí
  4. Auyán-tepuí
  5. Uaipán-tepuí
  6. Ptari-tepuí
  7. Chimantá-tepuí (Acopán-tepuí)
  8. Cerro Guaiquinima
  †Cerro Jáua
Venezuela, Territorio Amazonas
  9. Cerro Yaví
  10. Cerro Yutajé
  11. Cerro Guanay
  12. Cerro Camani
  13. Cerro Sipápo (Paráque)
  14. Cerro Moriche
  15. Cerro Parú
  16. Cerro Yapacana
  17. Cerro Huachamacari
  18. Cerro Duida
  19. Cerro Marahuaca
Colombia, Comisaria Vaupés
  20. Cerro Campana
  21. Cerro Chiribiquete
Colombia, Intendencia Méta
  22. Serranía de la Macarena

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*Ilú-tepuí. Not designated on map, but lying 40 kilometers northwest of Mt. Roraima. Visited by the Phelps–New York Botanical Garden Expedition of 1952.

†Cerro Jáua. Not designated on map, but lying approximately 150 kilometers southwest of Cerro Guaiquinima.

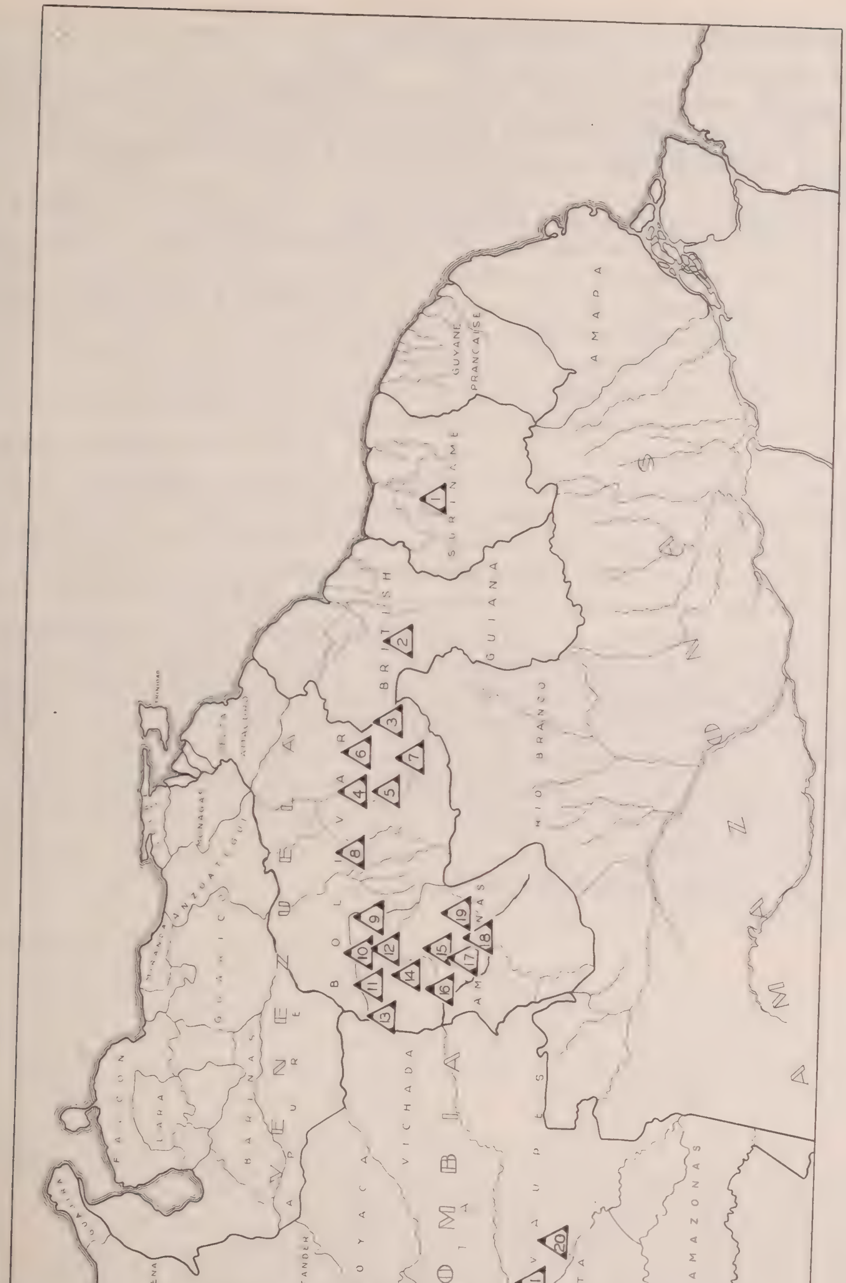
SURINAME
GUYANE FRANCAISE
AMAPA
BRITISH GUIANA
RIO BRANCO
AMAZONAS
VENEZUELA
BOLIVAR
AMAZONAS
APURE
BARINAS
GUARICO
ANZOATEGUI
MONAGAS
MIRANDA
FALCON
LARA
GUAJIRA
MAGDALENA
BOLIVAR
SANTANDER
ANTIOQUIA
BOYACA
CHOCO
PANAMA
COLOMBIA
VICHADA
META
VAUPES
CAQUETA
AMAZONAS
PUTUMAYO
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FIG. 1

vided, and in Puerto la Cruz the facilities of the company's staff house, commissary, and warehouse have been placed at our disposal.

Through the generosity of Mr. Mack Lake, President of the Orinoco Mining Company, Mr. G. G. Lancaster has in a similar manner placed the Company's facilities in Ciudad Bolívar at our disposal for the duration of the program of exploration.

Special funds, supplies and equipment have been generously donated by many friends of exploration and the New York Botanical Garden. Chief among these should be acknowledged the financial assistance of the Garden Club of America; the contributions of trade goods, miscellaneous supplies, hunting and fishing equipment by Sears Roebuck and Company, and by the Johnson Motor Company a 1951 Johnson "Seahorse" twenty-five horse-power outboard motor, so essential to travel on the "highways" of the interior, Venezuela's great rivers. New drugs and medicines developed within recent years have made the work of tropical exploration comparatively safe; Parke, Davis and Company supplied us with chloromycetin and camoquin, Charles Pfizer and Company provided terramyacin and penicillin, and Squibb and Company donated penicillin and sulfadiazine.

The forerunners in this program, Dr. G. G. H. Tate, Dr. H. A. Gleason, Dr. Tobias Lasser, and the many collaborators who have contributed their talent and knowledge to the earlier reports on the explorations of Roraima, Duida, Auyán-tepuí, Kaieteur, Tafelberg, and Yaví; Dr. Henri Pittier and his associates, Dr. Tobias Lasser, Dr. Francisco Tomayo, Dr. L. Schnee, Captain Felix Cardona; and Dr. Julian A. Steyermark, who has conducted independent exploration, have provided a background of immeasurable consequence. And, finally, in the present assessment of collections, the experienced judgment of colleagues is being sought to assure the most competent understanding and interpretation of the flora of Guayana that is possible at this time. The report of each contributor will appear over his own name.

THE NEW YORK BOTANICAL GARDEN
NEW YORK

ERIOCAULACEAE[21]

Eriocaulon atabapense Moldenke.

In moist sand among rocks 15 km. above San Fernando, Río Atabapo, Río Orinoco, *Maguire 29256.* The species is known only from this and three other collections: *Williams 13858, 14084* from the Río Atabapo, and a specimen without data in the Herbario Nacional de Venezuela which is probably a duplicate of one of the Williams collections. *A. C. Smith 2280,* cited as this species in Phytologia 3: 182 (1949), proves to be *E. tenuifolium.*

Eriocaulon humboldtii Kunth.

Occasional herb in wet border of Savanna III, 125 m. alt., Cerro Yapacana, Río Orinoco, *Maguire, Cowan, & Wurdack 30464.* The species ranges from Colombia (Méta) and Venezuela (Amazonas, Anzoategui, Bolívar, and Delta Amacuro) to British Guiana and Brazil (Amazonas and Mattogrosso).

Eriocaulon tenifolium Klotzsch.

With chalky-white heads, frequent in wet savanna northwest of the base of Cerro Moriche, 150 m. alt., Río Ventuari, *Maguire, Cowan, & Wurdack 30984.* The species is represented also by *Schomburgk 285* and *448* and *A. C. Smith 2280* from British Guiana. It has been reported from Bolívar, Venezuela, and from Amazonas and Bahia, Brazil, but perhaps erroneously.

Paepalanthus capillaceus var. proliferus Gleason.

Submerged aquatic perennial herb, with heads emergent white, becoming brown, abundant in the bed of Culebra Creek, 1200 m. alt., Cerro Duida, Río Cunucunuma, *Maguire, Cowan, & Wurdack 29611;* locally common in bed of Caño Culebra, 1300 m. alt., Cerro Duida, *Maguire & Maguire 29153.* Only some of the heads on these specimens have the proliferations described by Gleason; however all the heads show the characteristic pilosity not seen on any of the specimens of the typical form of the species thus far examined by me. The variety is known only from Cerro Duida *(Steyermark 58138)* and, in British Guiana, from Mount Roraima *(Tate 263, 552)* and the Kaieteur Plateau *(Maguire & Fanshawe 23243).*

Paepalanthus fasciculatus (Rottb.) Körn.

Frequent on white sand, savanna in the vicinity of Base Camp, 150 m. alt., Cerro Sipapo (Paráque), *Maguire & Politi 28309.* A widely distributed and very variable species known from Colombia (Cundinamarca, Méta, Santader del Norte, and Vaupés), Venezuela (Amazonas and Bolívar), British Guiana, Surinam, French Guiana, and Brazil (Amazonas and Pará).

Paepalanthus kunhardtii Moldenke, sp. nov.

Herba parva caulescens; caulibus brevibus brachiatis; foliis rosulatis oblongo-ovatis erectis utrinque lucidis 2.5–4 cm. longis, 3–5 mm. latis, ad basim longe villosis subcoriaceis; vaginis laxiusculis 4–5 cm. longis multistriatis glabris, lamina 5–6 mm. longa erecta longe ciliata; pedunculis graciliusculis brunneis 19–23 cm. longis tricostatis dense laxeque pilosis; capitulis hemisphericis atro-griseis 5–8 mm. diametro.

Small caulescent herb; stems 1.5–3 cm. long, often short-branched, densely long-villous; leaves rosulate, those at the tip of the main stem and of the branches forming what appears to be one many-leaved rosette, oblong-ovate, bright green and shiny on both surfaces, erect, 2.5–4 cm. long, 3–5 mm. wide at the mid-point, ampliate-clasping at the base, glabrous on both surfaces except for the long-villous base, acute or subacute at the apex, thick-textured or subcoriaceous;

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[21] By H. N. Moldenke.

sheaths rather loose, 4–5 cm. long, many-striate, slightly twisted, glabrous except for the mouth, obliquely split at the apex, the blade firm, erect, 5–6 mm. long, long-ciliate on the lower half of the margins; peduncles rather slender, 1 or 2 per stem and branch, 2–7 per plant, brownish, 19–23 cm. long, 3-costate, slightly twisted, densely loose-pilose with whitish ascending hairs; heads hemispheric, dark-gray, 5–8 mm. in diameter; involucral bractlets elliptic-ovate, dark brown or blackish, about 2 mm. long and 1 mm. wide, obtuse or subacute at the apex, glabrous or minutely ciliolate at the apex; receptacle long-pilose; receptacular bractlets obovate-spatulate, dark-brown, about 2.5 mm. long and 0.8 mm. wide, obtuse and densely white-barbellate at the apex; staminate florets: sepals 3, separate, oblanceolate, brownish, about 2 mm. long and 0.5 mm. wide, obtuse and densely white-barbellate at the apex, otherwise glabrous; petals 3, connate into a hyaline infundibular tube about 1.5 mm. long, glabrous; stamens 3, exserted, white; anthers white; rudimentary pistil brown, about 0.7 mm. long, 3-parted, included; pistillate florets: sepals 3, elliptic, about 2.5 mm. long and 0.5 mm. wide, brownish, obtuse, densely white-barbellate at the apex, lightly pilosulous on the back; petals 3, hyaline, linear, about 2.5 mm. long and 0.2 mm. wide, subacute, densely long-villous, the basal white hairs longer than the petal, the upper ones gradually shorter so that all reach about the same level; pistil brown, comparatively stout, about 2.7 mm. long, glabrous; style about 0.5 mm. long; stigmas 3, about 1 mm. long; style-appendages 3, about 1.5 mm. long; ovary small, about 0.5 mm. long and wide.

TYPE: in wet sphagnum hummocks, Camp Savanna, 4500 feet alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, December 11, 1948, *B. Maguire & L. Politi 27588;* New York Botanical Garden.

Paepalanthus lamarckii Kunth.

Heads grayish-white, occasional on moss-covered boulders, rapids above Playa Alta, Río Cunucunuma, Río Orinoco, *Maguire, Cowan, & Wurdack 29499.* This species has the widest and most amazing distribution of any member of the family, having been collected in British Honduras, Panama (Coclé), Cuba (Pinar del Río), Hispaniola, Isla de Pinos, Trinidad, Venezuela (Amazonas, Bolívar, Falcón, and Monagas), British Guiana, Surinam, French Guiana, Brazil (Amazonas, Ceará, Goyaz, Maranhão, Pará, Pernambuco, and Piauhy), and Marajo Island; also in French Guinea, Sierra Leone, French Equatorial Africa (Gabun), Tanganyika Territory, and Madagascar!

Paepalanthus maguirei Moldenke.

With white flowers, common among rocks, Culebra Rapids I, Río Cunucunuma, Río Orinoco, *Maguire, Cowan, & Wurdack 30364.* The species is also known from Tafelberg, Surinam *(Maguire 24241, 24832).*

Paepalanthus perplexans var. wurdacki Moldenke, var. nov.

Haec varietas a forma typica speciei recedit foliis 1.5–2.5 cm. longis, 2–2.5 mm. latis, capitulis subglobosis 4–5 mm. diametro.

TYPE: on cumbre, frequent, 2000 m. alt., Serranía Parú, Río Parú, Caño Asisa Río Ventuari, Amazonas, Venezuela, February 2, 1951, *R. S. Cowan & J. J. Wurdack 31141;* New York Botanical Garden. The typical form of the species is known only from Ptari-tepuí, Bolívar.

Paepalanthus tatei Moldenke.

Frequent in bogs about pool, Camp Savanna, 4500 feet alt., Cerro Sipapo (Paráque), *Maguire & Politi 27702;* frequent in moist sandy banks among rocks, Danta Falls, Río Cuao, Río Orinoco, *Maguire & Politi 27343;* among rocks in open

stream bed, Culebra Creek, 1300 m. alt., Cerro Duida, Río Cunucunuma, *Maguire, Cowan & Wurdack 29631.* The species is also known from Cerro Guanay, Cerro Sipapo, and Cerro Yaví, as well as from Auyán-tepuí in Bolívar, from the state of Lará, and from the Sierra de la Macarena in Colombia.

Paepalanthus williamsii Moldenke.

Occasional herb in moist places around border of Savanna No. III, 125 m. alt., Cerro Yapacana, Río Orinoco, *Maguire, Cowan & Wurdack 30806;* infrequent in wet places, border of Savanna No. III, 125 m. alt., *Maguire, Cowan & Wurdack 30463.* The species was hitherto known only from the Savanna de San Antonio, also in Amazonas *(Williams 15051)* and from a recent collection in the state of Amazonas, Brazil.

Syngonanthus alleni var. parvus Moldenke, var. nov.

Haec varietas a forma typica speciei recedit caulibus parvioribus, foliis glabris attenuatis, bracteis paucis brevioribus, pedunculis paucioribus, et capitulis florisque minoribus.

TYPE: on shallow wet sand on rock outcrop behind (east of) Hotel Amazonas, Puerto Ayacucho, Amazonas, Venezuela, October 24, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 29238;* New York Botanical Garden. The typical form of the species is known only from Vaupés, Colombia.

Syngonanthus anomalus (Körn.) Ruhl.

Stamens white, frequent on marshy bank along river, 1 km. above Culebra Rapids, Río Cunucunuma, Río Orinoco, *Maguire, Cowan & Wurdack 30409.* This species is known from Amazonas and Bolívar, Venezuela, as well as from British Guiana and from Amazonas, Brazil. Several rather poorly defined varieties and forms have been described.

Syngonanthus biformis (N. E. Br.) Gleason.

Common on mossy moist sandy banks along rocks, Danta Falls, 150 m. alt., Río Cuao, Río Orinoco, *Maguire & Politi 27342;* with white flowers, along stream in rain forest, Caño Culebra, 1000–1100 m. alt., Cerro Duida, Río Cunucunuma, *Maguire, Cowan & Wurdack 29518.* The species is known from Colombia (Vaupés) and Venezuela (Amazonas, Bolívar, and Sucre) to British Guiana and Surinam.

Syngonanthus caulescens (Poir.) Ruhl.

Moist sandy banks over rocks at Danta Falls, 460 feet alt., Cerro Sipapo (Paráque), *Maguire & Politi 27342a;* frequent in moist sandy banks among rocks, Danta Falls, Río Cuao, Río Orinoco, *Maguire & Politi 27343a;* infrequent along sandy stream banks under *Mauritia,* 18 km. south of Santa Barbara, Monagas, *Maguire, Kunhardt & Politi 27299.* The species is widely distributed in the New World, from Mexico (Veracruz) through Costa Rica, Colombia (Cundinamarca, Méta, Santander del Norte, and Vaupés), Venezuela (Amazonas, Anzoategui, Bolívar, Carabobo, and Monagas), British Guiana, Surinam, and French Guiana to Peru (San Martín), Brazil (Amapá, Amazonas, Bahia, Goyaz, Mattogrosso, Minas Geraes, Paraná, Pernambuco, Piauhy, Río de Janeiro, Río Grande do Sul, and São Paulo), Bolivia (Santa Cruz), Paraguay, and Argentina (Corrientes and Misiones).

Syngonanthus cowani Moldenke, sp. nov.

Herba parva caulescens 2–8 cm. alta; caulibus simplicibus vel usque ad 3-aggregatis gracilibus rigidis erectis atrobrunneis vel nigrescentibus marginatis densiuscule laxeque pilosis; foliis caulinis verticillatis adscendente-erectis; foliis basalibus numerosissimis dense rosulatis recurvo-reflexis anguste linearibus rigidiusculis 8–12 mm. longis subulatis glabratis 1-nervatis; inflorescentiis umbellatis densissimis terminalibus hemisphaericis vel subglobosis 1–2 cm. diametro; pedunculis 20–50 filiformibus 2–8 mm. longis parce pilosulis vel glabris.

Small caulescent herb, 2–8 cm. tall; stems solitary or sometimes with 1 or 2 smaller ones in addition, the main ones slender, rigid, erect, dark brown or blackish, more or less flattened and angle-margined, rather densely and loosely pilose with gray, irregular, mostly more or less appressed hairs, bearing a whorl of many cauline leaves 0.8–3.5 cm. from the base, the side stems without the cauline whorl of leaves; basal leaves very numerous, densely rosulate, recurved-reflexed to the ground, narrowly linear, rather rigid, 8–12 mm. long, less than 0.5 mm. wide, subulate-tipped, glabrate, 1-nerved, not fenestrate; cauline leaves similar but ascending-erect; inflorescence a very dense terminal umbel which is hemispheric or almost subglobose, 1–2 cm. in diameter on the main stems, 6–8 mm. in diameter on the secondary stems, composed of 20–50 or more short pedunculate heads, each peduncle subtended by a leaf-like bract; peduncles filiform, 2–8 mm. long, sparsely pilosulous or glabrous; sheaths absent, represented by an equitant-navicular bract to about 7.5 mm. long, minutely pilosulous, acute at the apex; heads obconic or subhemispheric, 3–4 mm. in diameter; receptacle short-pilose; involucral and receptacular bractlets hyaline or whitish, elliptic, about 2 mm. long and 0.5 mm. wide, acute at the apex, sparsely pilosulous on the back; staminate florets: sepals 3, whitish-subhyaline, connate at the base, the free portions elliptic, 1–1.5 mm. long, subacute or rounded at the apex, often with 1 or a few unicellular hairs at the tip; petals 3, white, connate into a slender infundibular tube for 1.5–2 mm., glabrous, the terminal free portion elliptic-spatulate, about 1 mm. long, rounded at the apex, glabrous; stamens 3, borne on the petals at the apex of the tube, included; filaments filiform, 0.4–0.5 mm. long, glabrous, white; anthers white; rudimentary pistil reaching the base of the free filaments; stigmas 3, white-capitate; pistillate florets: sepals 3, separate, whitish, elliptic, about 1.5 mm. long and 0.5 mm. wide, acute at the apex, sparsely pilose on the back; petals 3, white, spatulate, connate at the middle, free at base and apex, about 2 mm. long, to 0.4 mm. wide, rounded at the apex, glabrous; style about 0.5 mm. long, glabrous; stigmas 3, about 0.5 mm. long, white-capitate; ovary narrow-elliptic, glabrous, 3-sulcate, 3-celled, 3-ovulate.

TYPE: on sabanita 500 m. southeast of Savanna III, 125 m. alt., Cerro Yapacanna, Río Orinoco, Amazonas, Venezuela, December 31, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 30466;* New York Botanical Garden. Another collection is *Maguire, Cowan & Wurdack 30780,* locally frequent on Savanna No. I, 125 m. alt.

Syngonanthus flavipes Moldenke, sp. nov.

Herba acaulescens; foliis caespitosis lineari-oblongis crassis 2.5–4.5 cm. longis patentibus vel circinato-incurvis obtusiusculis utrinque minutissime pulverulento-puberulis vel glabris; vaginis tenuissimis arcte adpressis 4.5–7 cm. longis obscure multistriatis glabrescentibus, lamina lanceolata erecta arcte adpressa scariosa-marginata glabra vel ad apicem minute pilosula; pedunculis numerosissimis flavis 33–45 cm. longis 3-costatis glabris lucidis; capitulis hemisphaericis albis 3–6 mm. diametro.

Acaulescent herb; leaves cespitose, linear-oblong, thick-textured, 2.5–4.5 cm. long, about 1.5 mm. wide, spreading or the inner ones often circinately incurved, rather blunt at the apex, several-nerved beneath, not fenestrate, very minutely and obscurely pulverulent-puberulent on both surfaces or glabrate; sheaths very slender, closely appressed, far surpassing the leaves, 4.5–7 cm. long, obscurely many-striate, somewhat twisted, glabrescent, obliquely split at the apex, the blade lanceolate, erect, closely appressed, scarious-margined, glabrate or very minutely pilosulous at the acute apex; peduncles very numerous, yellow, about 30 per plant, 33–45 cm. long, 3-costate, glabrous, shiny; heads hemispheric, white, 3–6 mm. in diameter; involucral bractlets very tough and firm, concave, closely appressed to the head, yellowish-stramineous, elliptic, about 2.5 mm. long and 1 mm. wide, rounded at the apex, glabrous, very shiny; receptacle long-villous; receptacular bractlets whitish-subhyaline, spatulate-obovate, about 2.5 mm. long and 0.6–1 mm. wide, rounded at the apex, appressed-pilose on the entire back; staminate florets: sepals 3, separate almost to the base, spatulate, whitish-subhyaline, about 2 mm. long and 0.5 mm. wide, rounded at the apex, densely barbellate-pilose on the back above the middle; petals 3, connate into a subhyaline infundibular tube about 1.7 mm. long, glabrous; stamens 3; pistillate florets: sepals 3, hyaline, narrow-elliptic, about 2 mm. long and 0.5 mm. wide, very shortly barbellate on the back below the apex, otherwise glabrous; petals 3, narrowly oblong-spatulate, about 1.8 mm. long and 0.3 mm. wide, glabrous; style about 1 mm. long, glabrous; stigmas 3; ovary subglobose, about 1 mm. long, 3-sulcate.

TYPE: in wet places, Savanna No. III, 125 m. alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, December 31, 1950, *B. Maguire, R. S. Cowan & J. J. Wurdack 30465;* New York Botanical Garden.

Syngonanthus gracilis (Körn.) Ruhl.

Locally frequent in moist sand among rocks, 15 km. above San Fernando, Río Atabapo, Río Orinoco, *Maguire 29267.* This is a widespread and extremely variable species. The typical form is known from Colombia (Méta and Vaupés), Venezuela (Amazonas, Bolívar, and Sucre), British Guiana, and Surinam to Brazil (Amazonas, Minas Geraes, Pará, and Piauhy) and Uruguay. No less than 16 poorly defined and poorly understood varieties have been described, chiefly from Brazil.

Syngonanthus gracilis var. glabriusculus Ruhl.

With white flowers, in *Vellozia* association, cumbre at 1200 m. alt., Cerro Yapacana, Río Orinoco, *Maguire, Cowan & Wurdack 30714;* frequent on open banks, lower Caño Negro, 4400 feet alt., Río Cuao, Río Orinoco, *Maguire & Politi 27917.* This variety is also known from Bahia and Minas Geraes, Brazil.

Syngonanthus humboldtii var. elongatus Moldenke, var. nov.

Haec varietas a forma typica speciei recedit ramis 30–50 cm. longis, verticellis foliorum 14–21, et ramis saepe brachiatis.

TYPE: on Savanna No. III, 125 m. alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 1, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30558.* New York Botanical Garden.

Syngonanthus humboldtii var. glandulosus Gleason.

Dominant savanna herb, common in wet savanna northwest of base of Cerro Moriche, 150 m. alt., Río Ventuari, *Maguire, Cowan & Wurdack 30985.* The variety is known also from the lowland savannas about Cerro Duida *(Steyermark 57857, Tate 315),* Auyán-tepuí *(Tate 1308),* and San Fernando de Atabapo *(Holt & Gehriger 234).*

Syngonanthus humboldtii var. macrocephalus Moldenke, var. nov.

Haec varietas a forma typica speciei recedit capitulis 7–9 mm. latis et pedunculis densiuscule albido-pilosis, pilis irregulariter adpressis saepe contortis non glanduliferis.

TYPE: in depressions in rocks on the southeast slopes of North Mountain, 5000 to 6000 feet alt., Cerro Sipapo (Paráque), Amazonas, Venezuela, December 12, 1948, *B. Maguire & L. Politi 27649;* New York Botanical Garden. A second collection is *Maguire & Politi* 27796 from bogs near the summit of West Peak, 5300 feet alt.

Syngonanthus humboldtii var. orinocensis Moldenke, var. nov.

Haec varietas a forma typica speciei recedit caulibus crassioribus, foliis basalibus 3–8 cm. longis, foliis caulinis usque ad 2.3 cm. longis, pilis glanduliferis.

TYPE: under thickets on moist white sand about borders of small "laja," Río Temi, one hour below Yavíta, Río Atabapo, Río Orinoco, October 20, 1950, *B. Maguire 29340;* New York Botanical Garden.

Syngonanthus longipes Gleason.

Annuals to 1 m. tall, occasional in little wet savanna, 150 m. alt., northwest of the base of Cerro Moriche, Río Ventuari, *Maguire, Cowan & Wurdack 30983.* The species was hitherto known only from the Mount Roraima region of British Guiana *(Appun 1199, ImThurn 33, Schomburgk 1060)* and, in Bolívar, Venezuela, from 1100 m. on Mount Auyán-tepuí *(Tate 1329)* and from 1220 m. between Santa Teresita de Kavanayén and the base of Ptari-tepuí (*Steyermark 60304*).

Syngonanthus oblongus (Körn.) Ruhl.

With pale green leaves and white heads, at base of waterfalls, Culebra Creek, 1300 m. alt., Cerro Duida, Río Cunucunuma, *Maguire, Cowan & Wurdack 29630;* occasional in moist places among rocks, Caño Culebra, 1300 m. alt., Cerro Duida, *Maguire & Maguire 29158.* Whether var. *aequinoctialis* Ruhl. is really distinct is questionable. The characters given by Ruhland do not seem to be constant, but the typical form of the species seems to have macroscopically plainly villous heads, while the variety has them subglabrous. On this basis the specimens cited above represent the typical species which was known hitherto only from Colombia (Vaupés) and Brazil (Amazonas, Bahia, Goyaz, Mattogrosso, and Piauhy).

Syngonanthus phelpsae Moldenke.

Infrequent along Caño Grande, Campo Grande, 4500 feet alt., *Maguire & Politi 27584;* frequent in sphagnum hummocks, wet shrub savanna, Caño Negro, 3500 feet alt., *Maguire & Politi 27697.*

Syngonanthus phelpsae var. elongatus Moldenke, var. nov.

Haec varietas a forma typica speciei recedit caulibus 5 cm. elongatis et foliis 2.5–4 cm. longis.

TYPE: on cumbre at west rim, 2000 m. alt., Cerro Parú, Amazonas, Venezuela, January 31, 1951, *R. S. Cowan & J. J. Wurdack 31098;* New York Botanical Garden. The collectors note that all the material of this number was taken from a single clump.

Syngonanthus simplex (Miq.) Ruhl.

Frequent on white sand, border of small savanna in the vicinity of Base Camp, 160 m. alt., Cerro Sipapo (Paráque), *Maguire & Politi 28035.* The species is known from Amazonas, Bolívar, and Falcón, in Venezuela, as well as from British Guiana, Surinam, and Brazil (Minas Geraes).

Syngonanthus tenuis (H.B.K.) Ruhl.

Infrequent in wet places, Savanna No. III, 125 m. alt., Cerro Yapacana, Río Orinoco, *Maguire, Cowan & Wurdack 30473.* The species is known only from Venezuela (Amazonas and Bolívar) and Brazil (Amazonas and Pará).

Syngonanthus yapacanensis Moldenke, sp. nov.

Herba brevissime caulescens; foliis linearibus 1–2 cm. longis, ca. 0.5 mm. latis, patentibus brunnescentibus obtusis glabris firmis; vaginis pertenuibus arcte adpressis 1–1.5 cm. longis glabris; pedunculis paucis gracillimis stramineis 3.5–9.5 cm. longis tricostatis basim versus plusminusve albo-pilosis, apicem versus glabrescentibus; capitulis hemisphaericis albis 3–6 mm. latis.

Very shortly caulescent herb; stems 0.5–2 cm. long, or perhaps longer, rooting near the apex, often branched and leaf-bearing there, the leaf-bearing portion usually about 5 mm. long; leaves linear, 1–2 cm. long, about 0.5 mm. wide, spreading, brunnescent in age, blunt at the apex, glabrous, rather firm-textured, not plainly venose; sheaths very slender, closely appressed, 1–1.5 cm. long, not plainly striate nor twisted, glabrous, obliquely split at the apex, the blade oblong, about 3 mm. long, erect, blunt at apex; peduncles 1 or 2 per branch, very slender, stramineous, 3.5–9.5 cm. long, 3-costate, more or less white-pilose toward the base, glabrescent toward the apex; heads hemispheric, white, 3–6 mm. wide; involucral bractlets in several series, the outermost smallest, the innermost largest, stramineous, elliptic-obovate or the outermost ovate, 1.6–2.4 mm. long, 1–1.5 mm. wide, rounded and usually emarginate-split at the apex, the outermost often more or less laciniate, glabrous, shiny; receptacle densely long-pilose; receptacular bractlets oblong, whitish, about 1.5 mm. long and 0.5 mm. wide, obtuse at the apex, very densely long-barbellate with white hairs on the back at the apex, otherwise glabrous; staminate florets: sepals 3, separate, stramineous, spatulate, about 1.5 mm. long and 0.5 mm. wide, rounded and rather densely barbellate at the apex, otherwise glabrous; petals 3, connate into a stramineous infundibular tube about 1.5 mm. long, glabrous; stamens 3; pistillate florets: sepals 3, pale-stramineous, oblong, about 2.2 mm. long and 0.4 mm. wide, sparsely short-pilose at the apex on the back, otherwise glabrous; petals 3, subhyaline, lanceolate, about 2 mm. long, attenuate at the apex, sparsely short-pilose at the apex, otherwise glabrous; style about 1 mm. long, glabrous; stigmas 3, about 0.5 mm. long; ovary stramineous, subglobose, about 0.8 mm. long and wide, 3-sulcate, 3-celled, 3-ovulate.

TYPE: locally frequent in wet savanna No. I, 125 m. alt., Cerro Yapacana, Río Orinoco, Amazonas, Venezuela, January 7, 1951, *B. Maguire, R. S. Cowan & J. J. Wurdack 30782;* New York Botanical Garden.

LEGUMINOSAE-CAESALPINIOIDEAE

In attempting to identify the collections of the genus *Aldina* it was at once apparent that one of the collections was most certainly a new species and further study revealed that the other three represented material of a second undescribed species. With the exception of two new species described by Ducke nothing has been added to our understanding of this interesting genus since the treatment in the *Flora brasiliensis;* here no key was presented and the descriptions were often incomplete and inadequate. Because of this situation, I have undertaken a preliminary review of the genus.

The material on which this review is based is admittedly scanty and for this reason it is to be considered only as a preliminary study. It was a fortunate circumstance to have in our herbarium the holotypes or isotypes of all but one of the described species and this one was kindly loaned by the U. S. National Herbarium; for this assistance I am indeed grateful.

Key to the Species and Varieties of *Aldina*

1. Leaflets completely glabrous on lower surface as well as the upper. 2
1. Leaflets pubescent on lower surface, sometimes obviously but often minutely so. . 3
2. Mature buds 7–8 mm. long, petals 7–9 mm. long; stipe of ovary as long as or shorter than ovary; leaflets broadly ovate to lanceolate; inflorescence much-branched. . . . . 10. *A. heterophylla.*
2. Mature buds 15 mm. long, petals 15–20 mm. long; stipe of ovary 2–3 times as long as ovary; leaflets oblong, oblong-oval, or oblong-ovate; inflorescence racemose or lax and sparsely branched. . . . . 4a. *A. latifolia* var. *latifolia.*

3. All parts except upper leaf surface fuscous-velvety; calyx usually split into two parts. . . . . 3. *A. kunhardtiana.*
3. Pubescence where present minute, densely and closely-appressed, golden or golden-brown; calyx split into 3–5 irregular parts. 4
4. Leaves mostly 7–9–11-foliolate. 5
4. Leaves usually not over 5-foliolate (to 7-foliolate in *A. occidentalis*). 6
5. Leaflets 3–4 cm. wide, lanceolate-oblong, apices long-acuminate; mature buds about 1.5 cm. long; petals oblong, 2 cm. long, 0.8 cm. wide; filaments about 1.5 cm. long; ovary 5 mm. long with a stipe up to 10 mm. long. . . . . 2. *A. polyphylla.*
5. Leaflets (5.5–)7.5–11 cm. wide, oblong or oblong-oval, apex abruptly short-acuminate or acute; mature buds 2–2.5 cm. long; petals obovate-orbicular with cuneate base, 3–4.5 cm. long, 2.5–3.5 cm. wide; filaments 2.5–3.5 cm. long; ovary 7–8 mm. long (sometimes two ovaries produced per flower), stipe 1.5–1.8 cm. long. . . . . 1a. *A. insignis* var. *insignis.*
6. Hairs on lower leaflet surface strictly appressed, directed toward the apex and margin of leaflet, apex of leaflets not retuse or rotund. 8
6. Hairs on lower leaflet surface erect or suberect, collapsed and more or less decumbent on drying, apex of leaflets rotund and retuse. 7
7. Leaflets 7–8.5 cm. long, 3.5–4.5 cm. wide, lower leaflet surface obscurely pruinose-lepidote; mature buds about 1 cm. long, petals 2 cm. or less in length, stipe of ovary glabrous, about 1 mm. long, style glabrous. . . . . 9. *A. occidentalis.*
7. Leaflets 10–13 cm. long, 5.5–6.5 cm. wide, lower leaflet surface evenly glaucous; mature buds about 2.5 cm. long, petals 3.5–4.5 cm. long, stipe densely pubescent, 6–9 mm. long, style sparsely gray-sericeous. . . . . 1b. *A. insignis* var. *retusa.*
8. Ovary glabrous or subglabrous. 9
9. Ovary densely pubescent. 10
9. Blade of leaflets 21–22 cm. long, oblong, with 12–16 pairs of primary veins; inflorescence a sparsely-branched panicle, 20–30 cm. long, petals oblanceolate, 20–25 mm. long, stipe of ovary nearly as long as ovary. . . . . 8. *A. macrophylla.*
9. Blade 8.5–15 cm. long, ovate or elliptic-ovate, with 6–8 pairs of primary veins; inflorescence a regularly-branched panicle 15 cm. long, petals oval (in submature bud), 7 mm. long, stipe of ovary half as long as the ovary. . . . . 7. *A. yapacanensis.*
10. Stipe of glabrescent ovary about 10 mm. long, twice or more times longer than the ovary. . . . . 4b. *A. latifolia* var. *pubescens.*
10. Stipe of persistently-pubescent ovary 2.5 mm. long, as long as or shorter than the ovary. 11
11. Venation of leaflets very conspicuous on both surfaces; petals obovate-cuneate or oblanceolate-cuneate, 10–20 mm. wide; leaves 1–3-foliolate. . . . . . 5. *A. reticulata.*
11. Venation of leaflets barely prominulous below, obscure above; petals narrowly oblong or oblong-oblanceolate, 5–7 mm. wide; leaves mostly 5-foliolate. . . . 6. *A. discolor.*

1. Aldina insignis (Benth.) Endl.

1a. Aldina insignis (Benth.) Endl. var. insignis.

Allapia insignis Benth. Jour. Bot. Hook. 2: 91, as to type. 1840.

Tree 7–10 m. tall, the branchlets, petioles, rachis, and petiolules glabrous; leaves 7-9-foliolate, rarely 5-foliolate at the base of the inflorescence, the petioles 15 cm. long, the rachis 10–25 cm. long, the petiolules 8–15 mm. long, transversely corrugate, the leaflets plane, oblong or oblong-oval, 11–22 cm. long, 5.5–10.5 cm. wide, rotund at the base, at the apex abruptly acute, rarely rotund and retuse, above glabrous, below pallid, with numerous strongly-appressed minute hairs, the primary veins plane above, prominulous to prominent below; inflorescence puberulent with appressed, ferruginous, minute hairlets, mostly racemose, sometimes with a few branches, 15–30 cm. long, the bracts and bracteoles minute, the pedicels 3–5 mm. long, the mature buds about 2.5 cm. long; calyx 2–2.3 cm. long, densely ferruginous-tomentellous outside and gray villose inside, split into 4–5, usually erect lobes; petals 4–5, white, 4–4.5 cm. long, 2.5–3.5 cm. wide, obovate-orbicular, base cuneate, glabrous; stamens very numerous, glabrous, the filaments 25–35 mm. long, the anthers 6–10 mm. long; stigma simple, style subulate, incurved, glabrous, about 1 cm. long; ovary 3-4-ovulate, oblong, 7–8 mm.

long, 5 mm. wide, appressed-grayish puberulent, (sometimes 2 pistils per flower produced), the stipe grayish pubescent, 1.5–1.8 cm. long; fruit unknown.

Specimens Examined: "Upper Essequibo and Rupunoony in Guiana Anglica," *Schomburgk 524* (type no. of *Allania insignis* Benth.; US); Essequibo River, *Jenman 5247;* Makouria River, Essequibo River, *Sandwith 1574.*

The enormous flower buds and flower parts of this species prevent its being confused with any other species.

1b. Aldina insignis (Benth.) Endl. var. **retusa** Cowan, var. nov.

Arbor usque ad 13 m.; folia 5-foliolata, petiolis, rachibus, et petiolulis granulari-puberulis, petiolis 4–5 cm. longis, rachibus 3–5 cm. longis, petiolulis corrugatis, 7–10 mm. longis, foliolis oblongis, valde transverso-corrugatis, 10–13 cm. longis, 5.5–6 cm. latis, ad basim rotundatis, ad apicem rotundatis retusisque, supra glabris, subnitidis, infra glaucis, pubescentibus, pilis plus minusve erectis, flexuosis, brevibus, siccitate decumbentibus, venis primariis vix prominulis supra, infra salientibus; inflorescentiae terminales, racemosae vel laxe ramosae, 15–20 cm. longae, dense aureo-velutinae, alabastra matura ca. 2.5 cm. longa, pedicellis 5–7 mm. longis; calyx ca. 2.5 cm. longus, dense aureo-velutinus extus, intus arachnoideo-villosus, lobis 5, plus minusve aequalibus, lanceolatis, vix reflexis, petala 5, obovato-cuneata, 3.5–4.5 cm. longa, ca. 2.3 cm. lata; stamina numerosa, glabra, filamentis ca. 3 cm. longis, filiformibus, antheris 7 mm. longis, 1 mm. latis; stigma simplex, stylus sparse griseo-sericeus, plus quam 5 mm. longus, ovarium oblongum, 6 mm. longum, 3 mm. latum, dense griseo-puberulentum, stipite ca. 1 cm. longo, dense griseo-puberulis; fructus ignotus.

TYPE: Makreba Falls, Kurupung R., upper Mazaruni Region, February 25, 1939, *Pinkus 266;* New York Botanical Garden.

The uniformly retuse-tipped leaflets and different type of pubescence on the leaflets serve to distinguish this variety from the typical variety. These hairs are apparently exceedingly thin-walled, so that they collapse on drying and are not readily discernible. Such hairs are also characteristic of *A. occidentalis* Ducke but are not found otherwise in the genus. On the leaflets of the typical variety the hairs, though minute, are perfectly distinct with magnification, strictly appressed, and directed toward the apex and margin of the leaflet.

2. Aldina polyphylla Ducke, Arch. Inst. Biol. Veg. [Rio de Janeiro] 4: 17. 1938.

Large tree, all vegetative parts glabrous except the lower leaflet surface; leaves (5–7–)9–(11)-foliolate, 40 cm. long, the petioles 5 cm. long or longer, the rachis 8 cm. long or longer, the petiolules about 1 cm. long, the leaflets lanceolate-oblong, 8–16 cm. long, 3–4 cm. wide, the base obtuse, acute or rarely rotund, the apex long-acuminate, the upper surface glabrous, nitid, the lower surface minutely and sparsely appressed-puberulent, the venation subobscure above, prominulous below; inflorescence loosely paniculate, about 30 cm. long, densely subappressed puberulent, the pedicels 4–7 mm. long, the mature buds about 1.5 cm. long; calyx split into three strongly recurved parts, densely subappressed-puberulent outside and glabrous except for arachnoid-villose tips on the inner surface; petals 4, white, oblong, 2–2.3 cm. long, 0.8 cm. wide; stamens glabrous, filaments 1.5–2 cm. long, the anthers 6 mm. long, 0.8 mm. wide; ovary oblong-oval, 5-ovulate, appressed-aureo-puberulent, 5 mm. long, 3 mm. wide; style glabrous, except at base, about 6 mm. long, uncinate at tip; stigma simple, stipe about 1 cm. long, densely appressed-puberulent.

Specimens Examined: "Uarura, super Uanauaca, Rio Negro (civit.Amazonas)," *Ducke H.J.B.R. 35083* (isotypes at US, NY).

The plurifoliolate leaves of this species place it near *A. kunhardtiana* and *A. insignis* var. *insignis,* but it may be distinguished from the former by the minute, appressed pubescence of the lower leaflet surface and the lanceolate-oblong leaflet blades. From the latter it may be separated on its much smaller flowers and narrower leaflets.

3. **Aldina kunhardtiana** Cowan, sp. nov.

Arbor, aureofusca facie laminorum superiore excepta; folia imparipinnata, (2–)3–4-jugata, petiolis 4.5–9.5 cm. longis, rachibus 8–16.5 cm. longis, petiolulis 6–12 mm. longis, laminis 7–16.5 cm. longis, 4.5–7 cm. latis, basalibus brevioribus et lato-ovatis, ad basim rotundatis, ad apicem acutis, extremitate obtusa, margine integro, supra glabris, facie inferiore pruinoso-lepidota et pubescenti, pilis fusco-velutinis leviter in caespitis contortis, costa in facie superiore impressa sed infra valde salienti, venis primariis in circa 10 paribus, in facie superiore planis sed infra salientibus; inflorescentiae terminales, 15–27 cm. longae, adscendentes, paniculatae, bracteis lato-ovatis, 1.5 mm. longis, bracteolis lato-ovatis, 2 mm. longis, pedicellis ca. 3–4 mm. longis; alabastra obovoidea, calyx ca. 1.5 cm. longus, plerumque in 2 partes recurvatas fissus, petala 5–6, oblonga, breviter unguiculata, ca. 2 cm. longa, 0.8 cm. lata, glabra; stamina numerosa, filamentis glabris, 1.5 cm. longis, filiformibus, antheris linearibus, 6–7 mm. longis; stigma simplex, stylus porrectus, subulatus, 6.5 mm. longus, ovarium pilis pallido-fuscis appressis vestitum, oblongum, 6 mm. longum, 4 mm. latum, 4-ovulare, stipes articulatus, crassus, ca. 6 mm. longus, pilis pallido-fuscis appressis; fructus ignotus.

TYPE: small tree in mixed forest, inflorescence and calyx brown, petals and stamens white, Base Camp and Intermediate Camp, Cerro Sipapo, Territorio Amazonas, Venezuela, January 21, 1949, *Bassett Maguire & Louis Politi 28485;* New York Botanical Garden.

A. kunhardtiana is very distinct by reason of its velvety, rich-brown-colored indumentum. There are only two other groups, *A. insignis* var. *insignis* and *A. polyphylla,* which have the several-jugate leaves, and the new species is easily separable from either on the character mentioned above.

The specific epithet has been chosen in grateful acknowledgment of the very considerable assistance provided by H. R. Kunhardt, Jr. for the Kunhardt Venezuelan Expeditions of 1948–49.

4. **Aldina latifolia** Spruce ex Benth.

4a. **Aldina latifolia** Spruce ex Benth. var. **latifolia.**

Aldina latifolia Spruce ex Benth.; Mart. Fl. Bras. 15:(2) 12, as to type. 1870.

Tree 6–17 m. tall, glabrous except for inflorescence; leaves (1–)3–5-foliolate, the petioles 3.5–6.5 cm. long, nitid, the rachis 1.5–7.5 cm. long, nitid, the petiolules 1–1.5 cm. long, transversely corrugate, the blades oblong, oblong-oval or oblong-ovate, 8–12 cm. long, 3.5–7 cm. wide, the base rotund, the apex short-acuminate, the tip acute or obtuse, above nitid, below distinctly or obscurely tesselate, the venation obscure above, below the principal veins barely prominulous; inflorescence racemose or sparsely branched, densely appressed aureo-puberulent, about 15 cm. long, the pedicels 2–4 mm. long, the mature buds about 1.5 cm. long, ovoid; calyx about 1.5 cm. long, densely appressed-puberulent on outer surface, glabrous on inner surface except crisped-villose hairs at tip, splitting into 3 reflexed parts; petals 4–5, oblanceolate, 15–20 mm. long, 6–7 mm. wide; stamens glabrous, filaments about 15 mm. long, the anthers 4.8 mm. long, 0.7 mm. wide; stigma simple, style glabrous, straight or porrectate at the extreme apex; ovary oblong, 4–5 mm. long, 2.5 mm. wide, densely appressed-puberulent, later glabrescent, 4–5-ovulate, the stipe 1–1.5 cm. long, appressed-puberulent, not glabrescent; "legumen ovoideo-subglobosum, sulco utrinque exaratum, subdidymum, 2 poll. diametro" (from original description).

Specimens Examined: "In vicinibus Barra, Prov. Rio Negro," *Spruce s. n.* (isotype of *A. latifolia* Spruce ex Benth.; NY); Manaos, Igarape do Crespo, *Ducke 896.*

There are only two groups in the genus which have glabrous leaflets, this variety and *A. heterophylla,* but the two are so unlike that there is no possibility of confusion. In both this variety and var. *pubescens* the stipe is twice as long as the ovary or longer, a condition seen otherwise only in *A. insignis* var. *insignis* and *A. polyphylla;* the former has much larger flowers and the latter more and narrower leaflets.

4b. **Aldina latifolia** Spruce ex Benth. var. **pubescens** Cowan, var. nov.

A var. latifolia ramulis, petiolis, rachibus, petiolulis, et foliolorum facie inferiore appresso-puberulentibus, foliolis maioribus (13.5–17.5 cm. longis, 6–7.5 cm. latis) differt.

TYPE: "Prope San Gabriel da Cachoeira, ad Rio Negro, Brasiliae borealis, Jan.–Aug. 1852," *Spruce 2077;* New York Botanical Garden.

The specimen was cited by Bentham in the original publication of the species but on the sheet itself Spruce implied in a note that it might represent a variety of the species. The puberulent character of the vegetative parts separates this variety from the typical variety.

5. **Aldina reticulata** Cowan, sp. nov.

Arbor; folia 1–3-foliolata, petiolis 2-9.5 cm. longis, rachibus 1–3.5 cm. longis, petiolulis 0.8–1.5 cm. longis, foliolis oblongis vel late oblongo-ovatis, 7.5–18 cm. longis, 4.5–9 cm. latis, ad basim rotundatis, ad apicem acutis vel abrupte brevi-acuminatis, extremitate valde obtusa, margine integris, supra glabris et nitidis, infra sparse appresso-pubescentibus, pilis minutissimis, in facie superiore costa leviter impressa et venis nerviisque conspicue salientibus, infra costa venis nerviisque salientibus, venis primariis in paribus 8–9; inflorescentiae terminales, 10–40 cm. longae, laxae, adscendentes, racemosae, bracteis triangularibus, ca. 1 mm. longis, bracteolis ovatis, 0.6–0.8 mm. longis, pedicellis 3–6 mm. longis; calyx ca. 1.5 cm. longus, plerumque in 3 partes inaequales recurvatas fissus, petala 4, obovato-cuneata vel oblanceo-cuneata, 2–2.5 cm. longa, 1.0–1.8 cm. lata, glabra; stamina numerosa, filamentis glabris, ca. 1.5 cm. longis, antheris linearibus, 7 mm. longis, 1 mm. latis; stigma simplex, stylus crasso-subulatus, 3–6 mm. longus, ovarium valde appresso-pubescens, oblongo-ovale, 4–5 mm. longum, 2–3 mm. latum, 3–5-ovulare, stipite articulato, crasso, ca. 2–5 mm. longo, aureo-tomentello, infra glabro; fructus immaturus ovali-ellipsoideus, 2.5 cm. longus, 1.8 cm. latus, 1-seminifer, induratus, brunneo-pubescens.

TYPE: small tree with white flowers, montane mixed forest above Cano Grande, 1 km. n. w. of Savanna Camp, Cerro Sipapo, Territorio Amazonas, Venezuela, December 28, 1948, *Bassett Maguire & Louis Politi 27973;* New York Botanical Garden. Paratypes: small tree with white flowers, savanna vicinity Base Camp, Cerro Sipapo, December 30, 1948, *Maguire & Politi 28046;* small tree with white flowers, savanna near Base Camp, Cerro Sipapo, February 8, 1949, *Maguire & Politi 28820.*

The relationship of this species is probably nearest *A. latifolia,* but it differs in having the leaflets strongly reticulate-venose and the stipe of the ovary considerably shorter.

6. **Aldina discolor** Spruce ex Benth.; Mart. Fl. Bras. 15:(2) 12. 1870.

Tree to 13 m. tall, the branchlets, petioles, petiolules, and inflorescences appressed-puberulent; leaves mostly 5-foliolate, the petioles 3.5–4.5 cm. long, the rachis 2–4 cm. long, the petiolules 6–9 mm. long, the blades oblong-lanceolate, 6.5–12.5 cm. long, 3–5.5 cm. wide, rotund at the base, the apex abruptly short-acuminate with the tip acute or obtuse, nitid and glabrous above, below rather distinctly tesselate, subglaucous, appressed-puberulent, the venation nearly obscure above, prominulous below; inflorescence racemose or rarely branched, 18–30 cm. long, the bracts and bracteoles minute, the pedicels 2–2.5 mm. long, the mature buds about 1.5 cm. long; calyx densely appressed-puberulent outside, 1.0–1.5 cm. long, split into three recurved, unequal parts; petals 5, narrowly oblong or oblong-oblanceolate, 2–2.3 cm. long, 5–7 mm. wide, glabrous; stamens numerous, glabrous, the filaments about 1.5 cm. long, filiform, the anthers 5–6.5 mm. long, linear; stigma simple; style 1.5–2.5 mm. long, subulate, glabrous; ovary oblong, 3 mm. long, 1.8 mm. wide, 3-4-ovulate, the stipe stout, 2.5 mm. long, ovary and stipe densely appressed-pubescent; fruit unknown.

Specimens Examined: "Prope Panure ad Rio Uaupés," *Spruce 2802* (type no. NY); "Cachoeira das Araras, Vaupés, margem do rio Vaupés," *Froes 21306* (NY).

This species is easily recognizable by the tesselate-glaucous condition of the lower leaf surface, although such a condition is also present in *A. latifolia* var. *latifolia.* However, the leaflets of the latter are completely glabrous and those of *A. discolor* are appressed-puberulent on the lower surface.

7. **Aldina yapacanensis** Cowan, sp. nov.

Arbor mediocris, minutissime appresso-puberulens facie laminorum superiore excepta; folia imparipinnata, unijugata, unifoliolata juxta inflorescentiam, petiolis 2–4 cm. longis, rachibus ca. 1.5 cm. longis (vel 0), petiolulis 6–9 mm. longis, incrassatis, laminae 8.5 ad ca. 15 cm. longae, 4.5 ad ca. 8 cm. latae, ovatae vel elliptico-ovatae, ad apicem acutae, ad basim rotundato-obtusae, supra glabrae, facie inferiore pallidae, costa in facie superiore plana sed infra valde salienti, venis primariis in paribus ca. 6–8, planis; inflorescentiae terminales, paniculatae, erectae, ca. 15 cm. longae, rachibus ramulisque suis aureo-appresso-puberulentibus, bracteis late triangularibus, acutis, 0.7 mm. longis, 10 mm. latis, bracteolis triangularibus, 0.5 mm. longis, 0.5 mm. latis, pedicellis ca. 5 mm. longis; alabastra ovalia, ca. 1 cm. longa, calyx 10 mm. longus, in partes 4 plus minusve aequales recurvatasque fissus, extra valde aureo-appresso-puberulens, intra ad apicem villosulus, petala 4, (in alabastro) ovalia, sessilia, concava, 7 mm. longa, 5.5 mm. lata, glabra; stamina numerosa, filamentis glabris, ca. 15 mm. longis, filiformibus, antheris linearibus, 6 mm. longis, 0.8 mm. latis; (pistilli ex alabastro) stigma simplex, stylus brevis, porrectus, glaber, ovarium glabrum, oblongum, 7-ovulare, stipes articulatus, columnaris, longitudine ovarii dimidius, superiore parte minutissime sericea, inferiore glabra; fructus ignotus.

TYPE: medium tree, flowers brownish, along margin of Caño to Cerro Yapacana, Territorio Amazonas, Venezuela, January 6, 1951, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30758;* New York Botanical Garden.

Aldina yapacanensis, named for the fascinating region around Cerro Yapacana in which this plant was collected, is most closely related to *A. macrophylla* Spruce from the Rio Casiquiari. The greatest point of similarity is the glabrous ovary of both, the only two species in which this condition obtains. In addition, both have at most three leaflets but in the new species these are very much smaller and of different shape from those of *A. macrophylla.* The inflorescence of *A. yapacanensis* is a distinct, regularly-branched panicle while that of its nearest relative is very sparsely branched and to twice the length of that of the new species. In respect to floral characteristics, both species have four petals which are, however, quite different in size and shape in the two. The number of ovules per ovary is in both these groups higher than for most of the other species, seven in *A. yapacanensis* and five to seven in *A. macrophylla.*

It has been frequently stated that this region of southern Venezuela often shows a remarkable floristic affinity with the Rio Negro region, and this novelty supports such contentions, as do examples discussed elsewhere in this report.

8. **Aldina macrophylla** Spruce ex Benth.; Mart. Fl. Bras. 15(2): 13. 1870.

Tree to 17 m. tall, the vegetative parts except the upper leaflet surface appressed-puberulent; leaves 3-foliolate, the rachis 4 cm. long, the petiolules incrassate, finely corrugate transversely, 13 mm. long, the blades oblong, 21–22 cm. long, 8.5–9.5 cm. wide, the base rotund, the apex short-acuminate, the upper surface glabrous, nitid, with 12–16 pairs of primary veins barely prominulous, below subglaucous, with primary veins prominulous; inflorescence a sparsely-branched panicle 20–30 cm. long, fulvo-puberulent, the pedicels 3–7 mm. long, the mature buds about 1.5 cm. long, ellipsoid; calyx densely fulvo-puberulent outside, sparsely flexuose-villose inside; petals 4, oblanceolate, 2–2.5 cm. long, 1 cm. wide; stamens glabrous, the filaments 2 cm. long, the anthers 7 mm. long, 0.6 mm. wide; stigma simple; style straight, 3.5 mm. long; ovary oblong-elliptic, 5 mm. long, 1.8 mm. wide, glabrous, 5–7-ovulate, the stipe slender, densely appressed-puberulent, 4 mm. long; fruit unknown.

Specimens Examined: "Ad flumina Casiquiari, Vasiva et Pacimoni," *Spruce 3349* (type no.; NY).

The glabrous character of the ovary in this species is found elsewhere only in the preceding species, *A. yapacanensis*, from which it differs in having much larger and differently shaped leaflets. Also the inflorescence here is twice as long sometimes and only sparingly branched while in that species it is shorter and regularly branched.

9. **Aldina occidentalis** Ducke, Arch. Inst. Biol. Veg. [Rio de Janeiro] 4: 16. 1938.

Large tree, the vegetative parts granular-puberulent; leaves (3–)5(–7)-foliolate, the petioles 3.5–5.5 cm. long, the rachis 3.5–4 cm. long, the petiolules 5–8 mm. long, verrucose-corrugate, the blades oblong-oval, 7.5–8.5 cm. long, 3.5–4.5 cm. wide, the base rotund, the apex rounded and retuse, the upper surface glabrous, nitid, the venation prominulous, the lower surface minutely pruinose-lepidote and pubescent, the hairs minute, weak, collapsed in drying, erect when living, about 10 pairs of primary veins subsalient below and the veinlets prominulous; inflorescence terminal, laxly paniculate, to 28 cm. long, densely fusco-fulvo-puberulent, the pedicels 1–3 mm. long, the mature buds about 1 cm. long; calyx about 8 mm. long, split into about three unequal parts, densely cervino-puberulent; petals 6, in the immature flower 1.8 cm. long, 1.2 cm. wide, obovate-obcuneate, white; stamens glabrous, the filaments about 1 cm. long, united at the base, the anthers 5 mm. long, 0.5 mm. wide; style glabrous, 2.5 mm. long, straight; stigma simple; ovary oblong, 5 mm. long, 2 mm. wide, brunneo-sericeous, 4-ovulate, the stipe glabrous, about 1 mm. long; fruit unknown.

Specimens Examined: "São Paulo de Olivenca (Rio Solimoes, civ. Amazonas)," *Ducke H.J.B.R. 24051* (isotype; US).

Ducke related this species to *A. heterophylla;* the inflorescence and small buds of both does perhaps indicate some relationship. However, the leaflets of *A. heterophylla* are completely glabrous and the type of pubescence of *A. occidentalis* is found in only one other group, *A. insignis* var. *retusa.* The great difference in the size of the buds and flowers of these two groups is sufficient for their separation.

10. **Aldina heterophylla** Spruce ex Benth.; Mart. Fl. Bras. 15(2): 13. 1870.

Tree 20–30 m. tall, all parts except the inflorescence glabrous; leaves 1–3-foliolate, the petioles 5–45 mm. long, the rachis 5–12 mm. long, the petiolules 6–

10 mm. long, the blades ovate to lanceolate, 8.5–11.5 cm. long, 3.5–5.5 cm. wide, the base rotund, the apices acute or short-acuminate, the tip obtuse or acute and mucronulate, nitid above, the venation prominulous on both surfaces; inflorescences terminal or axillary, densely appressed-puberulent, paniculate, up to 15 cm. long, the bracts and bracteoles minute, the pedicels 1–2 mm. long, the mature buds 7–8 mm. long, subglobose; calyx 6.5–8 mm. long, split into 2–3 ascending, unequal parts; petals white, 4–6, obovate or oblanceolate-cuneate, 7–9 mm. long, 4–4.5 mm. wide, glabrous; stamens numerous, glabrous, the filaments 3.5–9 mm. long, filiform, united at the base, the anthers 2 mm. long; stigma simple; style subulate, 1.5 mm. long, glabrous or sparsely pubescent basally; ovary oblong, 2.5–3 mm. long, 1–2 mm. wide, golden-sericeous, 1–3-ovulate, the stipe 0.5–3 mm. long; fruit unknown.

Specimens Examined: "In vicinibus Barra, Prov. Rio Negro," *Spruce s. n.* (type coll.; NY); Amazonas, Brazil, *Ducke 59;* Manaos, Pensador, Amazonas, Brazil, *Ducke 142.*

The very small buds and flower parts of this species are quite distinctive; it could be confused only with *A. occidentalis* from which it differs in its pubescent stipe and glabrous, obtuse to acute-tipped, and usually fewer leaflets.

Bauhinia benthamiana Taub.

Frequent small arching tree to 5 m. high, flowers white, mesa 5 km. N.E. of Santa Barbara Camp, State of Monagas, November 1, 1948, *Maguire, Kunhardt & Politi, 27289.* A rather frequently collected species of British Guiana, Venezuela, and Northern Brazil.

Bauhinia bicuspidata Benth.

Shrub along sandy banks of river below falls, Danta Ralls, Río Cuao, November 19, 1948, *Maguire & Politi 27336-A.* This collection fits Bentham's description very well but no authentic material has been examined. This is the first record of the plant from Venezuela; it was formerly known from the states of Pará and Amazonas in Brazil.

Brownea similis Cowan, sp. nov.

Arbor ad 5 m. alta, ramulis sulcato-quadrangularibus, (cum petiolis petiolulisque) appresso-brunneo-pubescentibus, folia paripinnata, (5-) 10-jugata, petiolis 5–18 mm. longis, incrassatis, corrugatis, rachibus 8–40 cm. longis, teretibus, nitido-fuscis, glabris, petiolulis 4–6 mm. longis, incrassatis, foliola opposita ad alterna, glabra, parium infimorum 2 foliola ovata vel lanceolata, ad basim cordata, leviter inaequalia, parium superiorum angusto-oblonga vel oblongo-oblanceolata, ad apicem abrupte valde caudato-acuminata, ad basim latere superiore rotundo-cordata, inferiore acuta et glandulifera, 4–17 cm. longa, 2–4.5 cm. lata, supra griseo-viridia, infra glaucescentia; inflorescentiae terminales, sessiles, capitato-racemosae, axis 4–4.5 cm. longus, cervino-pubescens, bracteis exterioribus plus minusve orbicularibus, valde fusco-puberulis, 1.5–2 cm. longis, bracteis interioribus, obovatis vel oblanceolatis, ca. 3 cm. longis, flores coccinei, pedicellis 4–10 mm. longis, cervino-velutinis; vaginae hypocrateriformes, 2.5 cm. longae, ad apicem 8–10 mm. latae, bilabiatae, extus valde cervino-velutinae, intus puberulae, hypanthium 1.7 cm. longum, obcuneatum, extus glabrum, intus pubescens, sepala 4, inaequalia, glabra, maiora lato-oblanceolata, 2.5 cm. longa, 1.5 cm. lata, minora 2.5–3 cm. longa, 0.7–0.9 cm. lata, petala 5, lamina 1.8–2.5 cm. longa, 1–1.7 cm. lata, ovalis vel obovata, ad basim saepe biauriculata, unguiculo, filiformi, ca. 2 cm. longo; stamina 11, basibus exceptis libera, filamentis glabris, basibus interioribus exceptis, ca. 4 cm. longis, antheris 3.5–4.5 mm. longis, 2–2.5 mm. latis; pistillum stylo excepto fulvo-sericeum, 6–6.5 cm. longum, stipite ca. 1.5 cm.

longo, ovarium ca. 1 cm. longum, 8–12-ovulare, stylo ca. 3 cm. longo, glabro, stigmate terminali, capitato; fructus ignotus.

TYPE: tree 5 m. tall in mixed forest, petals bright orange-red, Caño Cuao, Territorio Amazonas, Venezuela, February 2, 1949, *Bassett Maguire & Louis Politi 28700;* New York Botanical Garden. Paratype: Base Camp, Caño Cuao, February 11, 1949, *Maguire & Politi 28968-A.*

B. similis, so-named because of the characters it shares with several other species, has its nearest relatives in Colombia, Peru, and Ecuador in the species *B. ariza, B. herthae, B. loretensis,* and *B. multijuga;* only one other species in Venezuela, *B. grandiceps,* has the multifoliolate leaves of the new species; *B. grandiceps* may be recognized by its immense heads of flowers and the densely strigose leaf parts. Of the previously mentioned species the new one is perhaps most nearly related to *B. ariza* and *B. multijuga.* It may be separated from these by the sulcate-quadrangular branchlets, which character is shared with *B. grandiceps.* The very strongly oblique leaflet bases of *B. similis* also distinguish it from either of its nearest relatives, but this is also characteristic of *B. loretensis* to nearly as great a degree; the latter has larger petals and the stem is subterete and glabrous. The sepals of *B. similis* are longer than those of its near relatives and the shape of the petals is also somewhat different. From *B. herthae* the new species may be separated on its glabrous sepals and much smaller inflorescence.

The specimens cited above show considerable variability in the number of leaflets per leaf and in their dimensions; the vegetative leaves have about ten pairs of leaflets which measure about 15 cm. long and 4.5 cm. wide. However, leaflets of leaves subtending the inflorescence are much smaller, averaging about 10 cm. long and 3 cm. wide, and the number of pairs is about five.

Campsiandra Benth. Jour. Bot. Hook. 2: 93. 1840.

Several collections of this genus were made and efforts toward their identification were quite unsatisfactory in the published literature; it therefore seemed profitable to undertake an introductory study of the genus. Besides the materials which are deposited in the Herbarium of the New York Botanical Garden (NY), the collections in the U. S. National Herbarium (US), including one type, were borrowed and studied. To this organization and particularly to E. P. Killip, I wish to express my appreciation for this cooperation.

Key to the Species and Varieties of *Campsiandra*

1. Calyx tube 2–3 mm. long, 2–3 mm. in diameter at apex, sepals mostly lanceolate or oblong-lanceolate, about 1.5 mm. wide. Petals plane or margins a little inflexed. Stipe of ovary 2.5–3 mm. long. Leaflets completely glabrous above. (Plants principally of headwaters of Amazon River in Brazil, Peru and Colombia). . . . 2. *C. angustifolia*

1. Calyx tube 4–5 mm. long, 3.5–5 mm. diameter at apex, sepals mostly ovate-triangular or lance-ovate, 2.5–3 mm. wide. Petals moderately cucullate. Stipe of ovary 4–10 mm. long. Leaflets appressed-pubescent or glabrous above. (Plants principally of northernmost Brazil and Venezuela or British Guiana.) . . . . *(C. comosa)* 2

2. Leaflets appressed-puberulent above. Sepals mostly ovate-triangular, about 2 mm. long. Filaments 3.5–4 cm. long. Style 3.5–5 cm. long, stipe of ovary 7–10 mm. long. (Plants of northernmost Brazil and Venezuela.) . . . . . 1b. *C. comosa* var. *laurifolia*

2. Leaflets glabrous above. Sepals mostly lance-ovate, 3–4 mm. long. Filaments about 2.5 cm. long. Style 2 cm. long, stipe of ovary 4–4.5 mm. long. (Plants endemic to British Guiana.) . . . . 1a. *C. comosa* var. *comosa.*

1. Campsiandra comosa Benth.

1a. Campsiandra comosa Benth. var. **comosa.**

C. comosa Benth. Jour. Bot. Hook. 2: 93, as to type. 1840.
C. surinamensis Kleinh. Rec. Trav. Bot. Néerl. 22: 406. 1925.

Low tree, the vegetative parts except the upper surfaces of the leaflets minutely appressed-puberulent; leaves 7–11-foliolate, the petioles 2–4.5 cm. long, narrowly winged, the rachis canaliculate-margined above, 5–16 cm. long, the petiolules 2–4 mm. long, transversely rugose; leaflets opposite or subopposite, (4–)7–15 cm. long, (2–)3–5 cm. wide, lanceolate, oblong-lanceolate or elliptic, the base obtuse or rotund, the apex acute to acuminate, the tip obtuse, the upper surface glabrous, nitid, below glabrous or with very few scattered, minute, appressed hairlets, the primary veins barely prominulous above, below the reticulation of the veins very distinct; inflorescences terminal, panicles of racemes, 7–11 cm. long, sparsely to densely appressed-puberulent, the bracteoles lanceolate, 1.5 mm. long, appressed-puberulent without but glabrous within, the pedicels 1–2 cm. long, articulate at the base of the flower; calyx-tube (3–)4–5 mm. long, 3.5–5 mm. wide at the apex, the lobes and tube sparsely appressed-puberulent without, the sepals lance-ovate or ovate-triangular, 3–4 mm. long, 2.5 mm. wide, obtuse; petals cucullate, oblong, 10–12 mm. long, 4.5–5 mm. wide, glabrous except for the ciliolate margin; stamens inflexed in bud, the filaments glabrous, 2.5 cm. long, the anthers oval, about 2 mm. long, 1 mm. wide, villose-hirsutulous on dorsal surface; pistil glabrous, sometimes abortive, the stigma expanded-truncate, the style about 2 cm. long, the ovary linear-oblong, about 5 mm. long, 1.5 mm. wide, 6–10-ovulate, the stipe 4.0–4.5 mm. long; fruit irregularly oblong, acentric on the stipe, 17–30 cm. long, 5–7.5 cm. wide, glabrous, the seed disciform, about 5.5 cm. diameter, the testa reddish-brown, chartaceous.

Specimens Examined: "Banks of the Essequibo," *Schomburgk 296* (type no. of *C. comosa* Benth.; US); Demarara River, May 1887, *Jenman 3915;* Mazaruni River, August 1889, *Jenman 5253;* riverside, British Guiana, June 1924, *Persaud 31;* junction of Mazaruni and Cuyuni Rivers, July 1924, *E. H. Graham 251.*

This typical variety is in its larger flowers more closely associated with variety *laurifolia* than with *C. angustifolia,* which it resembles in the glabrous upper leaflet surface and in the shape of the sepals. Variety *comosa* is separable from variety *laurifolia* on the glabrous condition of the leaflets already mentioned. It has the narrowest range of all the taxa in the genus, being restricted to British Guiana.

1b. Campsiandra comosa Benth., var. **laurifolia** (Benth.) Cowan, comb. nov.

C. laurifolia Benth. Jour. Bot. Hook. 2: 94. 1840.

Tree to 40 m. tall, very similar to var. *comosa* but differing in having 7–13-foliolate leaves; upper surfaces of leaflets distinctly appressed-puberulent; petioles up to 6 cm. long; sepals usually ovate-triangular and shorter (about 2 mm. long); filaments longer (3.5–4 cm. long); style longer (4–5 cm. long); stipe of the ovary longer (7–10 mm. long).

Specimens Examined: BRAZIL (Rio Negro Region); Patua, February 1944, *Baldwin 3271* (US); Santa Isabel, February 1944, *Baldwin 3433* (US); Ilha Nova Vida, February 1944, *Baldwin 3439* (US); Sao Gabriel, 90 m., Dec.–Jan. 1931, *Holt & Blake 607* (US & NY); Isla Macara, mouth of Rio Padauiri, January 1946, *Cardona 1269* (US); Santa Isabel, *Ducke 510* (US & NY); Uacara, September 1928, *Luetzelburg 22161* (NY); above Manaos, 25 m., October 1929, *Killip & Smith 30042* (US, NY); Macara, September 1929, *Tate 112, 113* (NY); Porto Curucuhy, Rio Negro, *Froes 21115* (NY, Belem). BRAZIL (Eastern and Southern): vicinity of Santarem, Pará, *Spruce s. n.*(NY); Pará, August 1943, *Baldwin 4017a*(US); Rio Caprin, Para, June 1897, *Huber 810* (US); Bella Terra, near Rio Tapajoz, Aug.–Sept. 1938, *Dahlgren s. n.* (US); Maues, November 1946, *Pires 114* (NY).

VENEZUELA: La Union, medio Caura, Bolívar, 80 m., February 1939, *Williams 11237* (US); "Caura desde Guayapo, hasta la boca del Nichare, Bolívar, 100–150 m.," April 1939, *Williams 11846* (US); "El Tigre, cerca del río Cuchivero, Bolívar, 90 m.," June 1940, *Williams 13307* (US); Pto. Ayacucho, 95 m., May 1940, *Williams 13120* (US);

Río Guainia, Maroa, February 1942, *Williams 14341* (US); "anegadas de las ríos Guainia y Negro, San Carlos, 100 m.," February 1942, *Williams 14470* (US); Esmeralda, alto Orinoco, 143 m., June 1942, *Williams 15458* (US); Ciudad Bolívar on Orinoco, Río la Pena, Feb.–March 1921, *L. H. & E. Z. Bailey* (NY); Apure, between Río Arauca and Cunaviche, February 1941, *Chardow 248* (US); Ciudad Bolívar, *E. Sifontes s. n.* (US); small tree along Cuao River, Danta Falls, November 19, 1948, *Maguire & Politi 27338* (NY): frequent tree to 40 m., La Urbana, March 8, 1949, *Maguire & Maguire 29006* (NY); tree, banks of Orinoco River, 30 km. below La Urbana, March 14–15, 1949, *Maguire & Maguire 29022* (NY); Río Ventuari, January 10, 1951, *Maguire, Cowan & Wurdack 30826*.

COLOMBIA: San Felipe, Comisaria del Vaupes, November 1948, *Romero 1199* (US).

2. **Campsiandra angustifolia** Spruce ex Benth.; Mart. Fl. Bras. 15(2): 55. 1870.

Tree 6–25 m. tall, all parts except the upper leaflet surface sparsely to subdensely appressed-puberulent; leaves 7–13-foliolate, the petioles 2.5–6 cm. long, narrowly winged, the rachis angled-canaliculate above, 5–16.5 cm. long, the petiolules 1–2 mm. long, transversely rugose; leaflets opposite to subopposite, 6–15 cm. long, 2–6.5 cm. wide, lanceolate, lance-elliptic, elliptic, oblance-oblong, or oblong-lanceolate, the base rotund or obtuse, the apex short-acuminate to acuminate, the tip obtuse, above glabrous, below with minute scattered appressed hairlets, the venation finely reticulate, prominulous on both sides; inflorescences terminal, 7–15 cm. long, compound panicles of racemes, the bracteoles lanceolate, glabrous within, the pedicels 1–1.5 cm. long, articulate at the base of the flower; calyx-tube 2–2.5 mm. long, 2–3 mm. in diameter at the apex, the sepals lanceolate or lance-ovate, 1.8–2 mm. long, 1.5–1.8 mm. wide, obtuse; petals plane or with margins somewhat inflexed, oblong, oblong-oval, or oval, 6–8 mm. long, 3–4.5 mm. wide, glabrous except for the ciliolate margin; stamens inflexed in the bud, the filaments glabrous, 2–3 cm. long, the anthers oval-oblong, 1.5 mm. long, 1 mm. wide, pilose dorsally; pistil glabrous, the stigma expanded-truncate, the style 2–2.5 cm. long, the ovary 4.5–5 mm. long, 1.5 mm. wide, linear-oblong 5-ovulate, the stipe 2.5–3 mm. long; fruit falcate, oblong, 21–26 cm. long, 5.5–7 cm. wide.

Specimens Examined: BRAZIL: "Prope ad Rio Uaupes," *Spruce 2561* (type no. of *C. angustifolia* Spruce ex Benth.; NY); Pará, State of Pará, April 1918, *Curran 5*(NY): State of Amazonas, municipality Humayta, near Tres Casas, basin of Rio Madeira, September–October 1934, *Krukoff 6366* (NY): Amazonas, Maues, November 1946, *Pires 166* (NY).

PERU (Depart. Loreto): Mishuyacu, near Iquitos, 100 m., September 1929, *Killip & Smith 29977* (NY); Caballo-Cocha on Amazon River, August 1929, *Williams 2345* (US); Manfinfa on upper Río Nanay, June–July 1929, *Williams 1142* (US); Gamitanacocha, Río Mazan, 100–125 m., *Schunke 92* (US); Mishuyacu, near Iquitos, 100 m., May–June 1930, *Klug 1375* (US & NY) and *Klug 1196* (US & NY).

COLOMBIA: Guaracapuri Cachoeira, Río Vaupés, region east of Mitu, November 1945, *Allen 3377* (US); Río Cuduyari orillas, afluente del Vaupes, 200 m., November 1939, *Cuatrecasas 6821* (US).

This species is distinct from *C. comosa* principally on its smaller flowers. Of the two varieties of that species it most closely approaches the typical one.

The distribution of this species is also rather interesting; while most of the collections come from the headwaters of the Amazon region in northwestern Brazil, northeastern Peru, and southeastern Colombia, single collections from southwestern Brazil and Belém represent the outposts of the distributional pattern. Future collections from these areas will probably reveal that the species occurs throughout the Amazonian and its tributary basins.

Cassia alata L.

Shrub or small tree to 8 m., flowers yellow, stems quadrangular, pod 4-winged, Isla Raton, Orinoco River, November 16, 1948, *Maguire & Politi 27320*. Common in cultivation and as a weed throughout the tropics of the world.

Cassia grandis L.f.

Tree 20 m. tall, inflorescence erect, flowers rose-pink, La Urbana, February 27, 1949, *Maguire & Maguire 28984.* Distributed throughout northern South America and the West Indies, also cultivated.

Cassia moshata H.B.K.

Frequent tree with yellow-bronze flowers (often in cultivation), Isla Raton, Orinoco River, February 15, 1949, *Maguire & Maguire 28981.* Ranging from Central America to Colombia, Venezuela, and British Guiana.

Cassia pteridophylla Sandwith.

Tree 8 m. high, flowers yellow, Río Cuao, Base Camp, January 19, 1949, *Maguire & Politi 28447.* Distributed from Venezuela to Brazil and British Guiana. This species was reduced to a variety of *C. adiantifolia* Bentham by Ducke, but the differences appear sufficiently important for its retention as a species. The two species are readily separable on the densely puberulent anthers and emarginate leaflet apices of *C. pteridophylla.*

Cassia racemosa Miller.

Small tree with yellow flowers, Murcielago Falls, Rio Sipapo, November 17, 1948, *Maguire & Politi 27310;* small tree or shrub in mixed forest near Base Camp, Caño Cuao, December 28, 1948, *Maguire & Politi 27980;* shrub or small tree, banks of Orinoco River, 30 km. below La Urbana, March 14-15, 1949, *Maguire & Maguire 29033.* Found throughout northern South America and as far south as Paraguay.

Cynometra microflora Cowan, **sp. nov.**

Arbor 15 m. alta, 1.5 dm. diametro, ramulis novellis (cum petiolis minutissime puberulis, demum glabratis; folia bifoliolata, glabra, petiolis 2-3 mm. longis, transverse corrugatis, in sectione ovalibus, foliolis concoloribus, inaequilateralibus, oblique ovali-ovatis vel ovali-lanceolatis, ambobus 1-2 cm. longis, 0.5-1.5 cm. latis, ad basim rotundo-truncatis, ad apicem obtusissimis, manifeste retusis, 3-4 nerviis prominulis; inflorescentiae brevissime racemosae, pedicellis ca. 4-5 mm. longis, filiformibus, glabris, sepala membranacea, petaloidea, oblonga, ca. 2 mm. longa, 0.8 mm. lata, glabra, petala lineari-lanceolata, 2-2.3 mm. longa, 0.5-0.7 mm. lata; stamina libera, glabra, filamentis filiformibus, 2 mm. longis, antheris ovalibus, 0.5 mm. longis, 0.4 mm. latis; stigma terminale, capitata, stylus filiformis, leviter arcuatus, 1.7 mm. longus, in ovario excentricus, persistens, ovarium ovale, uniovulatum, dense puberulum, 1.3-1.5 mm. longum, 0.9-1.7 mm. latum, stipite 0.4 mm. longo, puberulenti; fructus oblongo-oblanceolatus, dense puberulus, leviter verrucosus, 10 mm. longus, 6 mm. latus.

TYPE: Small tree to 15 m. tall and 1.5 dm. diameter, border of savanna, La Urbana, Orinoco River, Venezuela, March 8, 1949, *Bassett Maguire & Bassett Maguire, Jr. 29010;* New York Botanical Garden.

The small flowers of *C. microflora* enable it to be easily distinguished from its nearest relatives, *C. bauhinaefolia* Benth. and *C. parvifolia* Tul. The inflorescence is very similar to that of *C. bauhinaefolia* but the leaflets as well as the flowers are much smaller. The leaflets of *C. parvifolia* are nearer the size of those of the new species but they are smaller yet and oblong. The very minutely puberulent, later glabrate, branchlets of the new species contrast with the persistent, more obvious pubescence of the relatives.

Macrolobium Schreb.

Several collections of this genus were made and they are cited under the names now in use. However, a monograph of the genus is in progress at the moment and modifications of the nomenclature as well as the taxonomy may result from the study. For this reason only the collector with the collection number is cited under the tentative determination.

Macrolobium chrysostachyum (Miq.) Benth.
Maguire & Politi 28151, 28414.

Macrolobium confertum Gleason.
Maguire & Politi 27383, 27447, 28526.

Macrolobium discolor Benth.
Maguire & Politi 27978, 28819, 28823.

Peltogyne venosa (Vahl) Benth. var. **densiflora** (Benth.) Amsh.

Tree to 25 m. tall, frequent along river banks, Murcielago Falls, Sipapo River, November 17, 1948, *Maguire & Politi 27317.* This is the first record of this variety in Venezuela and is a northward extension of the range from the Amazon region. Var. *densiflora* differs from the typical variety in its pubescent ovary; the pubescence persists also on the fruit.

Swartzia maguirei Cowan, **sp. nov.**

Arbor parva, ramulis stipulis petiolis petiolulis inflorescentiisque aureofulvis; folia unifoliolata, stipulis linearibus, 2 mm. longis, petiolis 4–10 mm. longis, petiolulis 3–5 mm. longis, foliolis oblongis, 12–17 cm. longis, 4–6 cm. latis, chartaceis, concoloribus, fulvo-viridibus, ad basim rotundis, ad apicem abrupte caudato-acuminatis, cauda 1–2 cm. longa, venis utrinque aequaliter prominulis; racemi solitarii, axillares, ca. 9-floribus, 3–3.5 cm. longi, pedunculis 1 cm. longis, bracteis subulatis, 2 mm. longis, bracteolis 1–1.5 mm. longis, pedicellis 1–2 cm. longis, pallide aureo-sericeis, alabastra argenteo-sericea, haud apiculata, calyx ca. 1 cm. longus, in ca. 4 partes recurvatas inaequaliter fissus, intus arachnoideo-villosus, petalum (in alabastro solumvisum) unum, album, lato-ovatum, 2.5–3.5 mm. longum, 2–3 mm. latum, dorsualiter sericeum; stamina numerosa, glabra, 5 maiora antheras lineari-lanceolata habentia; ovarium ca. 12-ovulatum, margine interiore villosum aliter glabrum, 1.5 mm. longum, 1 mm. latum, stipite glabro, 1.5 mm. longo, stylus uncinatus, glaber, ca. 1 mm. longus; fructus immaturus obliquo-oblongus, ca. 3 cm. longus, 1.5 cm. latus, margine interiore excepto glaber, stylo 5 mm. longo, persistenti, stipite 1.5 cm. longo.

TYPE: small tree 3–4 m. tall, in mixed forest, along water course, vicinity Base Camp, Cerro Sipapo, Territorio Amazonas, Venezuela, December 28, 1948, *Bassett Maguire & Louis Politi 27983;* New York Botanical Garden.

There have been several unifoliolate species of Swartzia described but one species, *S. fimbriata,* recently described by Ducke appears, from the description at least, to be the most closely related to *S. maguirei.* The latter differs in the following respects: (1) It has larger leaflets which are uniformly oblong with (2) caudate-acuminate apices, and (3) silvery-sericeous calyces which are arachnoid-villose on the inner surface. There may, perhaps, be other floral differences but since the above description was based on immature flowers there is no advantage in comparing the various parts.

The new species is named in honor of Dr. Bassett Maguire, collector of the type material and enthusiastic student of the flora of northern South America.

Swartzia pinnata (Vahl) Willd. (not *S. pinnata* Willd. ex Vogel, Linnaea 11: 173. 1837. Nomen).

Banks of Cuao River, November 25, 1948, *Maguire & Politi 27449.* This species was originally described from Trinidad but there are records of its occurrence in Guiana and one collection from the Cordilleran region of Venezuela is deposited in this herbarium. The present collection shows only one point of departure from the species description and that is in the number of leaflets. *S. pinnata* is characterized as having five pairs of leaflets and this collection has seven pairs; however in every other respect the affinity appears to be unmistakeable.

Swartzia rotundata Cowan, sp. nov.

Arbor parva, omnes partes superficie foliolorum superiore excepta densissime fulvo-ferrugineo-sericeae; folia 3-4-jugata, petiolis subteretibus, 2.5–3.5 cm. longis, rachibus 2.5–7.5 cm. longis, supra leviter canaliculatis et ad basim foliolorum brevisissime alatis, petiolulis 1-4 mm. longis, foliolis 4-9.5 cm. longis, 2.5–5.5 cm. latis, valde discoloribus, chartaceis vel tenuiter coriaceis, vulgo ovali-oblongis vel ovato-oblongis, ad basim rotundatis, ad apicem rotundatis, fere retusis, interdum obtusis solum vel raro minime elongatis, supra subplanis, glabris, subnitidis, siccitate saepe olivaceis, infra saepe fuscis, sparse appresso-pubescentibus, pilis minutis, facie inferiore venis primariis in 6–8 paribus prominulis; inflorescentiae fasciculatae in ramis defoliatis productae, 8–18 cm. longae, multiflorae, racemosae, pedunculis 2.5–5.5 cm. longis, bracteis persistentibus, triangularibus, 0.8 mm. longis, bracteolis nullis, pedicellis 7–10 mm. longis; alabastra matura ovoidea, ca. 6 mm. longa et 5 mm. diametro, calyce ca. 5 mm. longo, in partes 4 recurvatas fisso, lobis plus minusve ovatis, intus glabris, petalum orbiculatum, 1–1.2 cm. longum, 1 cm. latum, unguiculo 3 mm. longo, glabro; stamina numerosa, glabra, 4 robustiora maiora, staminum minorum filamentis ca. 6.5 mm. longis, filiformibus, antheris oblongis, 1.5 mm. longis, staminum maiorum filamentis 7–9.5 mm. longis, crassioribus, antheris oblongis, 2–3 mm. longis; stigma brevisissimum, glabrum, stylus sericeus, leviter falcatus, ca. 1.5 mm. longus, ovarium sericeum, elongatum, 4 mm. longum, ca. 1 mm. diametro, 8-ovulare, stipite 5 mm. longo, glabro, filiformi; fructus immaturus lineari-fusiformis, usque ad 6 cm. longus et 1 cm. latus, fusco-sericeus.

TYPE: tree 20 m. tall, inflorescence erect, petals yellow, pink within, La Urbana, Orinoco River, Venezuela, February 27, 1949, *Bassett Maguire & Bassett Maguire, Jr. 28985;* New York Botanical Garden. Paratype: with same data, *Maguire & Maguire 28986.*

The very strong affinities of this species with *S. fugax* Spruce ex Benth. are certainly obvious but there appear to be a number of significant differences. *S. fugax* is apparently known only from the type locality, Santarem in the province of Para, Brazil (paratype in Herbarium New York Botanical Garden). The important differences between these two species may be best shown in a table:

	S. fugax	*S. rotundata*
Number of leaflets	5(–7)	(7–)9
Rachis	2.5 cm. long, wingless	2.5–7.5 cm. long, short-winged at base of leaflets
Leaflet pubescence	On both surfaces	On lower surface only
Peduncle length	6–8 mm.	25–55 mm.
Length of inflorescence	5–7.5 cm.	8–18 cm.
Petal shape and size	"narrowly ovate, ca. long as calyx"	nearly transversely oblong, ca. twice as long as calyx

The flowers of both species are extremely interesting, for they appear to be near to what must have been the primitive flower type in the genus. In three species of the genus the stamens are equal, in contrast to the strongly dimorphic androecium of most of the species. Equality of stamens may be interpreted as more primitive than the dimorphic condition. *S. fugax* and the new species occupy an intermediate position in this regard, for although the usual more massive stamens can still be distinguished by their much stouter filaments, there is not the sharp contrast between the larger and smaller stamens. In fact, in these two species there is almost a complete gradation in stamen length and anther size from the larger to the smaller.

LEGUMINOSAE-PAPILIONATAE

Alexa superba Cowan, sp. nov.

Arbor 5–20 m. alta, ramulis puberulis; stipulae triangulares, acutae, 4 mm. longae, 1.5 mm. latae, extus appresso-puberulae, intus glabrae, folia pendula, imparipinnata, 15–18-foliolata, petiolis 15–20 cm. longis, cum rachibus petiolulisque aureo-fusco-puberulis, rachibus 43–67.5 cm. longis, petiolulis 7–11 mm. longis, lamina 13–30 cm. longa, 5–9 cm. lata, foliorum basim versus minore, oblongo-lanceolata, oblonga vel ovato-lanceolata, ad basim rotundata, ad apicem acuminata, supra in costa valde puberula, alibi restricte ad sparse puberula, infra aureo-pilosula, venis primariis in paribus 8–12, aeque cum costa leviter impressis supra, infra valdissime salientibus, venulis supra obscuris, infra salientibus et manifesto reticulatis; inflorescentiae terminales, racemosae, 5–5.5 dm. longae, fusco-puberulae, pedunculo ca. 25 cm. longo, 1 cm. diametro, bracteis caducis, lanceolatis, 10–11 mm. longis, 4 mm. latis, aureo-sericeis sed intus restricte, bracteolis lineari-lanceolatis, 5--7 mm. longis, 1.5 mm. latis, intus glabris, pedicello 9–10 mm. longo, 4 mm. diametro, fusco-puberulo; clayx campanulatus, 30–35 mm. longus, ad apicem 25 mm. diametro et incomposite sinuatus, extus dense fusco-puberulus, intus ad apicem aureo-sericeus, petala 5, alutacea, extus densissime aureo-sericea, intus glabra, cucullata, vexillo maximo, 7.8 cm. longo, 1.8 cm. lato, spathulato-oblanceolato, petalis reliquis aequalibus, 5.8–6.2 cm. longis, ca. 1 cm. latis; stamina 12, glabra, filamentis 5–5.5 cm. longis, antheris linearibus, 15–17 mm. longis, 1.5 mm. latis; (pistilli paulo post anthesin) stigma simplex, stylus 30 mm. longus, glaber, ad apicem uncinatus, ovarium elliptico-oblongum, 25 mm. longum, 7 mm. latum, aureo-pilosulum, valvis carnosis, 9-ovulare, stipes 18 mm. longus, columnaris, aureo-pilosulus; fructus submaturus 25.5 cm. longus, 5 cm. latus, fusco-velutinus, stylo persistenti, ca. 32 mm. longo, semina in pulpa sucosa immersa.

TYPE: locally frequent tree 5–20 m. tall; petals apically cucullate, cream inside, golden brown sheen outside, one petal larger, margin of Caño Asisa (tributary of Río Parú), near Puerto Camp, Territorio Amazonas, Venezuela, February 17, 1951, *Richard S. Cowan & John J. Wurdack 31531;* New York Botanical Garden.

Alexa superba is probably most closely allied to *A. confusa* Pittier from the middle Rio Caura in Venezuela. This conclusion may or may not prove to be valid, for I have seen material of only three of the six species previously described and the opinion expressed is based largely upon the descriptions. *A. superba* differs, first of all, from all the other species in the genus in its larger leaves with more leaflets and in the presence of 12 stamens instead of the customary ten. In addition to these characters, the new species differs from *A. confusa* in the possession of pubescence on both leaf surfaces, a broadly campanulate calyx rather than the narrow one of *A. confusa;* the calyx of the latter is glabrous within whereas the apex of the calyx on the inner surface in *A. superba* is aureo-sericeous.

The distribution of the plant is likewise interesting; it was observed only along this stream in that portion near our savanna camp, downstream for perhaps a couple of miles. In this expanse outcrops and knobs of the ancient granitic basement rock abound but as these outcrops disappear downstream, this plant also disappears. Whether there is any real correlation between the two distributions was not determined but the apparent restriction of the plant may very well be due to edaphic factors.

Centrosema pubescens Benth.

Frequent herbaceous vine, flowers purple, Murcielago Falls, Sipapo R., November 17, 1948, *Maguire & Politi 27313.* Widely distributed in Central America, West Indies, and tropical South America.

Clitoria javitensis (H.B.K.) Benth.

Frequent woody vine, flowers purple, keel white, Murcielago Falls, Sipapo R., November 17, 1948, *Maguire & Politi 27314;* infrequent vine in woodland, vicinity Base Camp, Cerro Sipapo, December 30, 1948, *Maguire & Politi 28044;* occasional vine with purple flowers, mixed forest, Base Camp, Cerro Sipapo, January 10, 1949, *Maguire & Politi 28296;* woody vine, mixed high forest, vicinity Base Camp, Cerro Sipapo, January 17, 1949, *Maguire & Politi 28419.* Widely distributed from Colombia, northern Brazil, Guiana, and Venezuela to Central America.

Dalbergia inundata (Spruce) Benth.

Liana, Río Cuao, January 3, 1949, *Maguire & Politi 28154.* Known from Brazil and Venezuela.

Dioclea guianensis Benth.

Vine with purple flowers, secondary growth, vicinity Santa Barbara, State of Monagas, October 24, 1948, *Maguire, Kunhardt & Politi 27249.* Widely distributed from Panama south to Brazil, through Colombia, Venezuela, Guiana, and Trinidad.

Dipteryx cordata Ducke.

Tree, Base Camp, Cerro Sipapo, January 12, 1949, *Maguire & Politi 28305-A.* This is the first report of this species in Venezuela; known previously only from northern Brazil.

Eriosema rufum Benth.

Infrequent perennial herb, erect, to 1.5 m. high, flowers yellow, mesa 5 km. N. E. of Santa Barbara Camp, State of Monagas, November 1, 1948, *Maguire, Kunhardt & Politi 27288.* Recorded for Peru, Venezuela, British Guiana, and Pará in Brazil.

Lonchocarpus benthamianus Pittier.

Frequent tree to 15 m. tall, flowers purple, secondary growth along roadside, vicinity Guanaguana, State of Monagas, October 24, 1948, *Maguire, Kunhardt & Politi 27235.* According to the description the ovary encloses four ovules but in this collection the ovary is about seven-ovulate; this is the only significant deviation. The species is known from the West Indies, Trinidad, and Venezuela.

Machaerium inundatum (Benth.) Ducke.

Small compact tree, banks of Orinoco, 30 km. below La Urbana, March 8, 1949, *Maguire & Maguire 29003.* Distributed from Central America and Mexico to Venezuela, Guiana, and northern Brazil.

Mucuna pruriens (L.) DC.

Vine, secondary growth, Picnic Grounds, Santa Barbara Camp, October 27, 1948, *Maguire, Kunhardt & Politi 27268-A.* Cultivated throughout tropic regions of the world, originally from tropical Asia.

Phaseolus adenanthus Mey. var. adenanthus.

Vine with pale purple flowers, North Mountain, Cerro Sipapo, January 25, 1949, *Maguire & Politi 28605*. The species is widely distributed in South America but this variety has been recorded previously only from Colombia, Ecuador, and Surinam.

RUTACEAE

Apocaulon Cowan, gen. nov.

Herba acaulescens; folia radicalia, composita; inflorescentia racemus dichotomus; calyx quinquelobatus, lobi inaequales; corolla tubuliformis quinquelobata, lobi duo abaxiales superius juncti in labium bilobatum; stamina quinque, antheris duobus fertilibus se adspicientibus forte cohaerentibus, antheris basi flabello conspicuo ornatis, filamentis inferne liberis juxta antheram corolla adhaerentibus; discus cupuliformis, aequilateralis; ovarium e carpellis quinque in stylum basaliter alatum junctis, stigmate quinquelobato; fructus e mericarpiis uno ad quinque, singulatim semen unicum gignentibus.

Apocaulon carnosum Cowan, sp. nov.

Axis erectus, 3–4 mm. diametro; planta omnino pilis multis resinosis vestita (floribus exceptis) appresso-puberula; folia trifoliolata, foliola ovalia ad suborbiculata, membranacea quando sicca, carnosa quando recentia, supra atroviridia infra virido-alba venis pilis multis appressis et areolis inter venas pilis multis resinosis brevioribus, marginibus integris et densissime ciliatis, basis folioli extremi aequilateralia et obtusa ad acutam, foliolorum lateralium inaequilateralis et obtusa ad acutam, apices acuti ad subobtusos, foliola lateralia 2–3.3 × 1.5–2.5 cm., foliolum extremum 4–7.5 × 3–4 cm., petiolulis 3–13 mm. longis, petiolus 6–12 cm. longus, teres, carnosus; inflorescentiae 11–19 cm. longae, pedunculis 9–14.5 cm. longis, rami quaque 2–4.5 cm. longi, pedicellis filiformibus, 0.5–2.5 mm. longis, a bracteis minutulis subtentis; calyx lobis brevissime cohaerentibus, inaequalibus, linearibus, rectis vel leviter patentibus, in fructo persistentibus et nonnihil accrescentibus, ad apices obtusis, extus hispidulis, intus lobis adaxialibus exceptis puberulis, marginibus integris et densius ciliolatis; duobus adaxialibus 1 × 0.5 mm., uno abaxiali 1.5 × 0.5 mm., duobus lateralibus 2.5–4 × 0.5–0.7 mm.; corolla alba, 3.5–6.2 mm. longa, tubuliformis, curva, tuba ad basim glabra, ad apicem pilis deflectis, 1.5–3 mm. longa (labium lobis altius junctis), lobis forte imbricatis, oblongis vel ovalibus (labii lobis angustioribus), subconcavis, ad apicem obtusis et hispidulis, reliqua parte flexuoso-puberulis; staminum fertilium antherae rectae, glanduloso-puberulae et in dorso hispidulae, ellipticae, basifixae, 1 × 0.5–0.7 mm., ad basim appendicibus flabelliformibus undulatis circa 0.5 × 0.5 mm. ornatae, filamentis ligulatis, 2–3.3 × 0.3–0.6 mm., pollinorum grana 55 × 45 micra, subglobosa, superficie levi, forte alveolata; staminodia subulata, 1.5–6.5 mm. longa, unum vel duo longiora et uncinata, filamentis ligulatis 0.3 mm. latis, filamentis omnibus infra liberis, juxta corollae fauces adhaerentibus, loco adhaerentiae densius lanulatis; discus plus minusve quinquelobatus, truncatus, ovarium arcte circumcludens, 0.4 × 0.5–0.8 mm.; stigma quinquelobatum, diametro aliquanto modo quam stylus maius; stylus circa 1.2–1.8 mm. longus, columnaris, prope apicem leviter curvus, ad basim quinquealatus; ovarium 0.4 × 0.4–0.7 mm., carpello quoque duobus ovulis placenta axili superpositis; mericarpia dorso rostrata ad apicem, 2.5 × 1.5–2 mm., recto-puberula, exocarpio costis parallelibus horizontalibus humilibus, endocarpio albo, dehiscentia ab exocarpio separante; semina 1.5–1.8 × 1.2 mm., nigra, subtuberculata ad tuberculata, supra hilum rostrata, testa tenui, crustosa, cotyledonibus suborbicularibus, radicula brevi robusta.

TYPE: succulent herb, leaves dark green above, whitish-green below; flowers white, fertile anthers pinkish-tinged; fruit green, seeds black; locally abundant in semi-swampy pockets and on humus-covered boulders in montane forest at Intermediate Camp, 900 m. altitude, Cerro Huachamacari, Territorio Amazonas, Venezuela, December 4, 1950, *Maguire, Cowan & Wurdack 29829;* New York Botanical Garden. Paratypes: Cerro Huachamacari, 800 m. altitude, between Lower and Upper Escarpment, November 29, 1950, *Maguire, Cowan & Wurdack 29796;* Cerro Marahuaca, Territorio Amazonas, Venezuela, 4000' (1300 m.) altitude, May 11, 1949, *Maguire & Maguire 29188.*

The material of this new genus was first collected by Maguire in 1949 on the Kunhardt Expedition to Cerro Marahuaca. This is another of the numerous sandstone tabletop mountains in the southwestern state of Amazonas; it lies parallel to the well-known Cerro Duida and only a few miles northeast of it. The southeasternmost extension of Marahuaca is designated on the map (South America 1:1,000,000-Rio Branco Sheet) as Marahuacita; it was on one of the lateral ridges on the north side of the latter near the headwaters of the Rio Podamo that the first material was collected. Since the one collection of it was (unavoidably) a unicate, it was with the greatest satisfaction that we found the plant again on the nearby mountain, Cerro Huachamacari, during the New York Botanical Garden's 1950–51 Expedition. As a result it was possible to collect abundant material and observe it extensively in living condition.

Altitudinally it extends from about 2500 to 4000 feet on the upper talus slopes in the diffuse light of dense montane forest. It is always found growing under high-moisture conditions in pockets of wet humus or in moss-covered humus accumulations over logs, boulders, and the like. The plants are quite uniform in all respects, although a single individual was observed with a diminutive basal lobe on one of the lateral leaflets. It is most frequently associated with ferns, aroids, and bromeliads and is exceedingly abundant locally; above our Intermediate Camp at 3500 feet, although the conditions were apparently identical with those at slightly lower elevations, it disappeared entirely.

The generic name refers to the acaulescent habit of the plant while the specific epithet is derived from the fleshy condition of the vegetative parts.

The characters of the plant clearly ally it with the subtribe Cuspariinae of the tribe Cusparieae, a group restricted to tropical America and best-represented in northern South America. To this subtribe are now assigned sixteen genera and twelve of these include plants with zygomorphic flowers. The zygomorphy may be expressed in either the calyx, the corolla, the androecium, or in all these structures. Studies of a preliminary nature have revealed that the zygomorphic-flowered genera are, for the most part, rather closely related. However, there appear to be at least two divergent phylogenetic lines; in one the fertile anthers have developed flabellate or saccate appendages at their bases whereas the other is characterized by the absence of such structures. *Apocaulon* is thus properly assigned to the appendaged-anther group which includes *Raveniopsis, Lubaria, Erythrochiton, Raputia,* and *Galipea.* It is readily separable from its near relative by its fleshy, acaulescent habit; by its fertile anthers cohering face to face; by its long uncinate staminodia; and by its basally alate style. The only other near-herbaceous genus in the subtribe is *Monnieria,* one of the unappendaged-anther group, from which *Apocaulon* is distinct by (in addition to the anther appendages) its more distinctly bilabiate and curved corolla; by its relatively longer and often uncinate staminodia; by its five-lobed stigma; and by its basally alate style.

Decagonocarpus oppositifolius Spruce ex Engler.

Frequent, small tree to 8 m., flowers fleshy, red, Middle Camp, Cerro Sipapo, November 25, 1948, *Maguire & Politi 27442;* shrub or small tree to 5 m., flowers fleshy, scarlet, opening along creek, Base Camp, Cerro Sipapo, November 27, 1948, *Maguire & Politi 27473;* shrub, red flowers, North Mountain, Cerro Sipapo, January 25, 1948, *Maguire & Politi 28604;* large shrub or small tree, flowers fleshy, orange-red, fruit green when mature, seed black, mixed forest, Intermediate Camp, Cerro Sipapo, February 2, 1949, *Maguire & Politi 28706;* shrub or shrubby tree to 4 m., bark white, flowers red-orange, waxy, corolla 5-parted, tube carinate, locally frequent on granitic monadnock (Acejerut) 20 miles above Playa Alta, Río Cunucunuma, December 28, 1950, *Maguire, Cowan & Wurdack 30441, 30457.*

The number of specimens cited here would indicate that this plant is not uncommon in southwestern Venezuela; however, there is no evidence in our herbarium or in the literature that it has been recollected since Spruce's original collection. It is of particular interest that all the collections cited were made from plants growing on a granitic substratum. Indeed, Spruce mentions it in his notes as a component of the vegetation of the granitic domes so characteristic of this Upper Orinoco country.

The flowers are especially striking because of the waxy-fleshy consistency of the angular corolla; the lobes apparently never open widely but remain nearly closed even in their fully expanded condition. The leaves are also somewhat fleshy in texture and are borne decussately on the somewhat quadrangular stem.

Galipea stelligera Cowan, sp. nov.

Arbustum 3–4 m. altum, ubique dendroideo-stelligerum; folia trifoliata, petiolis communibus sulcatis, 1.5–4 cm. longis, foliola elliptica, supra fusco-viridia, supra venas alutaceo-stelligera, infra albo-viridia, ubique densissime alutaceo-stelligera, apicibus basibusque acutis, foliola terminalia 4–7 × 1.5–2.5 cm., petiolulo 6–10 mm. longo, sulcato, foliola lateralia 3–7 × 1–2.5 cm., petiolulo 2–5 mm. longo, sulcato, ad basim inaequalia; inflorescentiae axillares vel terminales, cymosae, pedunculo 4–5 cm. longo, ramulos duos 5–20 mm. longos gignenti, bracteis linearibus, ca. 3 mm. longis, bracteolis linearibus, ca. 1.5 mm. longis, pedicello 0.5–1.5 mm. longo, vel floribus sessilibus; calyx quinquelobatus, lobis subaequalibus, oblongo-ovalibus, obtusis, 2.5–2.8 × 1.3–2 mm., erectis, tubo ca. 0.7 mm. longo, corolla aurantio-rubra, tubulata, lobis 5, acutis, quatuor 2.5 × 1.5–2.5 mm. triangularibus, quinto triangulari-lanceolato, 2.5 × 3.5 mm., tubo cylindrico-infundibuliformi, 19.5–20.5 mm. longo, ca. 6 mm. diametro; stamina 5, solum 2 fertilibus, in tubum corallae tubo adnatum conjugantia, staminum fertilium antherae oblongae, apiculatae, lateraliter cohaerentes, 2.5 × 0.7 mm., ad basim appendicibus flabelliformibus, ca. 1.5 × 1.2 mm. ornatae, filamentis ligulatis, 19.5–20 mm. × 1–1.5 mm., staminodia ligulata, 20 mm. longa et ca. 1 mm. lata, ad apicem subulata; discus cupuliformis, obscure quinquelobatus, margine quinqueundulata, ca. 0.8 mm. altus; stigma oblique quinquelobatum, lobis verrucosis, stylus 19 mm. longus, glaber, ovarium densissime hispidulum, 1 × 1.5 mm., quinquelobatum, carpellis ovula dua gignentibus; mericarpia immaturissima, uniseminalia.

TYPE: occasional, shrub 3 m., flowers orange-red, mossy forest on ridge west of Caño Culebra, summit of Cerro Duida, Territorio Amazonas, November 22, 1950, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 29653-A;* New York Botanical Garden. Paratype: shrub to 4 m., corolla orange-red, slightly angled, 2 fertile stamens coherent, cloud forest at 5000', Culebra Creek Drainage, summit of Cerro Duida, November 19, 1950, *Maguire, Cowan & Wurdack 29551.*

This species is not at all closely related to any other but in its deeply dissected calyx it most closely resembles *G. bracteata* of Brazil. The dendroid-stellate pubescence alone is adequate for separating *G. stelligera* from all other previously-described species in the genus and the corolla too is quite unlike that found in any other species. In all species examined the corolla tube is very narrowly cylindrical and elongate whereas in the new species it is proportionately much wider and expands slightly toward the apex; in all other respects, however, it is properly included in the genus *Galipea.*

Ravenia paruana Cowan, sp. nov.

Arbusta procumbentia, 0.1–1.5 m. alta, ubique hispida, ramulis subquadrangularibus; folia simplicia, coriacea, 1.3–2.4 × 0.8–1.8 cm., ovata, suborbicularia vel ovalia, valde convexa, margine revoluto, integro, costa supra valde impressa et venulis obscuris, costa venulisque infra salientibus, ad apicem obtuse acuta, ad basim obtusa, petiolis 2–2.5 mm. longis; flores singulariter ad apices ramulorum producti, pedicello 1.5–3 mm. longo, sparse hispido, calyx irregularis, quinquelobatus (vel raro sexlobatus), lobis inaequalibus, ciliatis, hispidis, valde venosis, 2 exterioribus inaequalibus maioribus, lobo maximo oblanceolato, acuto, 10 × 4 mm., lobo secundo maximo oblongo-elliptico, 6.8 × 2 mm., 3 lobis reliquis 5.5–6.5 × 1.2–1.4 mm., lineari-ellipticis, corolla aurantio-roseo-rubra, subappresso- vel appresso-hispida, arcuata, extra leviter costata, lobis subinaequalibus, obtusis, plus minusve ovatis, 6.5–7 × 4.2–4.5 mm., tubo ca. 17 mm. longo, infundibuliformi, stamina 5, solum 2 fertilia, in tubum corollae tubo adnatum cohaerentia, staminum fertilium antherae oblongae, 2.5 × 1 mm., lateraliter cohaerentes, ad basim appendicibus orbicularibus, 0.5 mm. diametro ornatae, filamentis ligulatis, 13 × 1.5 mm., tubi parte centrali pilosa, staminodia ligulata, 17 × 0.8 mm., solum parte apicali libera et 4 mm. longa, subulata; discus 0.6 × 1.1 mm., carnosus, ovarium ex toto includens; stigma 5-digitatum, digitis incomposite lobatis, 0.7–1 mm. longis, stylus glaber, 11 mm. longus, filiformis, ovarium 0.6 × 0.9 mm., glabrum, sparse verruculosum, in quinque carpellis liberis consistentibus, carpellis ovula dua gignentibus; mericarpia non vidi.

TYPE: frequent, shrub 0.1–1.5 m., flowers orange-red, semi-open, rolling sabanita, about 2000 m., south of upper camp along west rim of escarpment, cumbre of Cerro Parú, Territorio Amazonas, February 7, 1951, *Richard S. Cowan & John J. Wurdack 31285;* New York Botanical Garden. Paratypes: frequent, sprawling shrubs 0.1–0.5 m., flowers orange-red, leaves coriaceous, margins involute, just south of valley head of upper camp creek, cumbre of Cerro Parú, 2000 m., February 2, 1951, *Cowan & Wurdack 31167;* locally frequent, usually sprawling shrubs 0.1–1.25 m., flowers orange-red, margins of sabanitas, cumbre Cerro Parú, 2000 m., February 4, 1951, *Cowan & Wurdack 31225.*

This species is unquestionably related to the other appendaged-anther species of the Guayana Highland, namely, *R. linearis* Gleason, *R. tatei* Gleason and *R. ruellioides* Oliver. It differs from all these in leaf shape, from the two latter species in its glabrous ovary, and from the two former species in its staminodes of equal length.

This genus is characterized by calyx lobes in two series of which the two outer ones are somewhat larger and by the production of one-seeded mericarps which are free from each other even in the flower. As the genus was originally described, the anthers were unappendaged but in a number of taxa described since the anthers possess basal appendages. As this is the only significant morphological difference between these species and the earlier-described ones, it is felt, at the present, that a new genus to contain these later-recognized species would contribute nothing constructive to the situation. In subsequent studies it will most likely be considered only of sectional importance, but any such innovations must, for the moment, be postponed to such time that very careful, detailed study of the entire subtribe Cuspariinae may be undertaken; such a study is contemplated for the future by the author.

Ravenia ruellioides Oliver.

Cerro Sipapo, *Maguire & Politi:* Rare, small shrub, along banks of Lower Caño Negro, January 1, 1949, *28095;* rare, small shrub 5 dm. tall, fls. scarlet, stream banks of Lower Caño Negro, January 1, 1949, *28111;* infrequent, shrub 1 m. high, corolla coral-colored, Caño Profundo, Cerro Sipapo, January 10, 1949, *28271;* occasional, shrub 1 m. high, flowers tubular, coral-red, watercourse in Upper East Basin, 1800 m., January 20, 1949, *28459;* occasional, shrub 1 m. high, fls. scarlet, South Savanna, South Basin, January 26–28, 1949, *28667.*

This very uniform species probably extends over the entire length of the Pacaraima System. It was described originally from collections from Mount Roraima where it has been since recollected; now it is known from Auyan-tepuí, Ptari-tepuí toward the northern end of the System, and the collections cited above represent the southernmost extension of the range.

MALPIGHIACEAE

Diacidia Grisebach and Sipapoa Maguire.

The first collection, a single specimen, of the new genus *Sipapoa* was made by Schomburgk in the "mountains of British Guiana." It was assigned to the genus *Coleostachys* as *C. vestita* by Bentham,[22] who remarked at the similarity of the enlarged calyx with those of previously known species of *Coleostachys.* But he also pointed out that the ovary of the Schomburgk specimen is "entirely undivided, while in *Coleostachys* it is three-lobed and the style ventrifixed." Later Bentham and Hooker[23] transferred the species to *Diacidia* as *Diacidia vestita* (Benth.) Benth. & Hooker, to which genus it is indeed closely related. Niedenzu[24] did not admit this remarkable species to his monograph of the family. Recently a number of new collections have come into my hands which have required a revaluation of the several relationships within the subtribe Byrsoniminae to which they all belong.

The genus *Diacidia* is characterized essentially by evaginate but connate petioles, paniculate-scorpioid inflorescence, sepals which apparently do not become ampliate in maturity, 10 stamens, and anthers which are barbate at the base and curiously bicornute by two inwardly recurved spinose awns. In *Diacidia vestita* (Benth.) Benth. & Hook. and four additional recently collected species, the petioles are conspicuously connate-vaginate, the inflorescence simply spicate, the sepals conspicuously ampliate in maturity, the stamens 8 or 6, and the anthers bicornute but not barbate. It is obvious that these latter species are generically inconsistent with *Diacidia.* As a consequence I propose the new genus *Sipapoa* to accommodate them.

As the two genera now stand, *Diacidia* consists of two closely related species and is so far as known confined to the rain-forest area of the upper Rio Negro. *Sipapoa* with 5 remarkably distinct species seems to be restricted to sandstone areas of the Guayana Highland.

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[22] Lond. Jour. Bot. 7: 124. 1848.

[23] Gen. Pl. 1^1: 253. 1862.

[24] Pflanzenreich 4: 141. 1928.

Diacidia Griseb. Fl. Bras. 12^1: 119. 1858.

Diacidia duckeana is the second species of the genus. It is adequately set off from *D. galphimioides* Griseb. which (from description and photograph of the type) has more strongly pubescent narrower oblong-elliptic leaves with acute or acuminate apices and bases, petioles 2–4 mm. long, cymes 3-flowered, and petals subequal.

Key to the Species of *Diacidia*

1. Leaves oblong-elliptic 2 cm. or less broad, base and apex acute or
 acuminate; petioles 2–4 mm. long; petals subequal. 1. *Diacidia galphimioides.*
1. Leaves ovate 3.5–4.5 cm. broad, base obtuse, apex subacute apiculate;
 petioles ca. 10 mm. long; petals unequal, the fifth twice the length of
 the smaller. 2. *Diacidia duckeana.*

Diacidia duckeana Maguire, sp. nov.

Fruticulus 1 m. altus; ramis teretibus cretaceis plus-minus dense subrufo-sericeis; internodiis 4–5 cm. longis; foliis oppositis, laminis submembranaceis ovatis 6–8 cm. longis 3.5–4.5 cm. latis, ca. 8 jugis prominulis nervis, supra subtusque sparsissime strigosis, apice subacuto apiculato, basi obtusa, petiolis ca. 1 cm. longis sericeis non-connatis, stipulis ad basim ca. 2 mm. connatis, intrapetiolaribus connatis ovatis 3-4 mm. longis subpilosis; foliis inflorescentiam subtendentibus 4 cm. longis 2.5 cm. latis subsessilibus; inflorescentia terminali ca. 15 cm. longa glabra subcretacea paniculata, ramulis ca. 1 cm. longis, cymis 5–6 floribus indeterminatis unilateralibus floribus inferioribus caducis, pedunculis secundis ca. 2 mm. longis, pedicellis gracilibus 6–8 mm. longis, bracteis caducis non visis, bracteolis ovato-orbicularibus concavis 4–5 mm. longis; floribus flavidis 1.75 cm. latis, sepalis ovato-lanceolatis obtusis 3–4 mm. longis conspicue biglandularibus evidenter in maturatis non-ampliatis, petalis inaequilateralibus minore ca. 5 mm. longo, maximo 10–12 mm. longo valde ungulatis, laminis orbicularibus crispo-crenulatis; staminibus 10 subaequilateralibus vel 3 anticis brevioribus, filamentis ad basim in annulo piloso-hirsuto 1 mm. connatis, partibus liberis 1.5–2.0 mm. longis glabris, antheris ad basim introrsis basifixis barbatis ca. 1 mm. longis, apice bicornuto, aristis ca. 0.5 mm. longis introrse nectantibus connectivo non-conspicue thesis excedentibus; ovario glabro 2-loculare, loculis uniovulatis; stylis 3 glabris subulatis ca. 4 mm. longis; fructibus non visis.

TYPE: in rupibus graniticus montium Cucuhy, Rio Negro super, fruticulus 1 m. [altus], fl. flavis, Amazonas, Brazil, Sept. 22, 1935, *A. Ducke 34633;* U. S. National Herbarium No. 1740259.

Sipapoa Maguire, gen. nov. Galphimieae Niedenzu, Byrsoniminae Niedenzu.

Inflorescentia spicata; sepalis maturis ampliatis; staminibus (5) 6–8, antheris glabris bicornutis; ovario biloculare glabro tristylari, stylis subulatis, loculis uniovulatis; cotyledonibus aequalibus oblongis inflexis lateraliter adpressis.

Frutex vel arbor parva; petiolis valde connato-vaginatis. Genotypus *Sipapoa kunhardtii* Maguire.

Key to the Species of *Sipapoa*

1. Inflorescence strongly pubescent.
 2. Leaves glabrous on upper surface.
  3. Mature sepals oblong or lanceolate.
   4. Leaves broadly elliptic to suborbicular, glabrous and glaucous
    beneath except for the sparsely pilose nerves and conspicu-
    ously ciliate margins; sepals denticulate. 1. *Sipapoa kunhardtii.*
   4. Leaves elliptic, membranous, densely sericeous beneath, the
    nerves obscured, margins not ciliate; sepals entire. 2. *Sipapoa hypoleuca.*

3. Mature sepals ovate-cordate, margins ciliolate; bractlets 4-angled, densely red-hirsute; leaves coriaceous, oblong-elliptic 4–6 cm. long, 1–2 cm. broad, stipules not connate. 3. *Sipapoa ferruginea.*
2. Leaves densely pubescent on upper surface, as are leaf-sheaths, stipules and sepals; stipules not connate. 4. *Sipapoa vestita.*
1. Inflorescence glabrous, glaucous; stipules large, foliar exceeding 2 cm. long; mature sepal lanceolate, entire. 5. *Sipapoa stipularis.*

1. **Sipapoa kunhardtii** Maguire, sp. nov.

Frutex vel arbor parva 2–5 m. alta; ramulis 3–4 mm. diam. in sicco sulcatulis sparse patenter rufo-hirsutulis mox glabratis, internodiis 1–2 cm. longis; foliis oppositis, laminis ellipticis vel suborbicularibus (3.5) 5–7 cm. longis (2) 3–5 cm. latis chartaceis cum 5 jugis nervis lateralibus, supra glabris marginibus exceptis, nervis prominulis impressis, subtus flavi-albidis glaucis glabris marginibus nervisque exceptis, marginibus conspicue hirsuto-ciliatis, nervis sparse sed conspicue hirsuto-pilosis, apice obtuso vel brevissimo-cuspidato, basi obtusa, petiolo ad basim in vaginam 12–18 mm. connato hirsutulo vel glabrescenti granulari-glauco intus dense adpresso-hirsuto parte libera 5–7 mm. longa, stipulis intrapetiolaribus lanceolatis acutis 10–12 cm. longis, lateraliter connatis 3–4 mm.; inflorescentia pleniflora terminali racemosa (7) 10–14 cm. longa rufo-fulvo-hirsuta; bracteis inferioribus unijugis ad basim in tubo ca. 1 cm. connatis, parte libera subfoliacea 1–2 cm. longa lanceolata vel oblanceolata acuta vel obtusa, bracteis superioribus 4–6 mm. longis ellipticis vel lanceolatis obtusis conspicue rufo-hirsuto-pilosis glaucis; bracteolis 2–3 mm. longis ovatis subacutis submembranaceis rufo-hirsutulis caducis; pedicellis 3–8 mm. longis hirsutulis; floribus ca. 8 mm. diam. flavis, sepalis ca. 3–4 mm. longis lanceolatis glandulari-denticulatis glabris vel sparse hirsutulis flavi-rubescentibus squarrosis biglandularibus, maturis 10–12 mm. longis 3–4 mm. latis oblongo-lanceolatis denticulatis membranaceo-chartaceis foliaceis rubrovenosis plusminusve conniventibus; petalis flavis 4–6 mm. longis, unguibus 2–3 mm. longis ca. 0.75 mm. latis, laminis ovatis 3–4 mm. longis cordatis flavis; staminibus 8, filamentis subaequalibus liberis ca. 2.5 mm. longis 0.75 mm. crassis subteretibus rubris glabris ad basim intus subpilosis; antheris oblongis glabris subaequalibus tribus 1.0 mm. longis, quinquibus 1.2 mm. longis, theca albida ad apicem 2-aristata, aristis ca. 0.5 mm. longis spinulosis nigrescentibus introrse nectantibus vel adscendentibus; toro plano glabro; ovario glabro 2-loculare 1-2-ovulato, stylis 3 subulatis 2–3 mm. longis subacutis; fructibus indehiscentibus ovoideis ca. 2.5 mm. longis subverrucosis, pericarpio indurato; seminibus ca. 2 mm. longis lenticulari-obovatis, testa membranacea, cotyledonibus subaequalibus carnosis, interiore inflexo-conduplicato exteriore cucullato-concavo-orbiculari semi-incluso.

TYPE: shrub or small tree to 4 m. high, flowers yellow, expanded sepals bright red, frequent in open savanna, Caño Negro, 1500 m. alt., December 15, 1948, Cerro Sipapo, Terr. Amazonas, Venezuela, *Bassett Maguire & Louis Politi 27677;* New York Botanical Garden. Paratypes, Cerro Sipapo, *Maguire & Politi:* small tree 4 m. high, low woodland below Lower Camp Savanna, *27672;* small tree 3–4 m. high, flowers yellow, frequent, Lower Caño Negro, *28104.*

Sipapoa kunhardtii is a frequent shrub of the Caño Negro savannas where it is conspicuous because of its attractive yellow spikes and brilliant red ampliate fruiting calyces. It appears to be the sole species of the genus on Sipapo, and was collected only in the Caño Negro drainage.

2. **Sipapoa hypoleuca** Maguire, sp. nov.

Frutex; ramulis obscure quadrangularibus glabris glaucis, internodiis 8–20 mm. longis; foliis oppositis, laminis ellipticis vel oblongo-ellipticis 4–8 (11) cm. longis 1.8–4.0 (6.5) cm. latis, supra glabris, subtus dense albo-subfulvis piloso-sericeis granulari-glaucisque, nervis lateralibus ca. 7–8-jugis, apice obtuso cuspidato, basi obtusa, petiolorum partibus liberis 3–6 mm. longis dense piloso-hirsutis, vaginis 2–3 mm. longis glabrescentibus valde glaucis, stipulis ad basim 2–3 mm. connatis, ad petiolum adnatis 12–14 mm. intrapetiolaribus connatis 2–4 mm., lobis liberis acute triangulari-lanceolatis 5–8 mm. longis dense piloso-hirsutis; inflorescentia multiflora (6) 8–12 cm. longa racemosa fusco-hirsuta; bractearum subtendentium stipularibus 15–18 mm. longis, lobis 5–8 mm. longis dense piloso-hirsutis, bracteis lanceolatis acutis vel trilobatis 7–10 mm. longis extus dense pilosis intus glabris, bracteolis obovatis subacutis vel obtusis sparse pilosis vel subglabris, 2–4 mm. longis ciliatis; pedunculis brevissimis minus 0.5 mm. longis, pedicellis gracillimis 10–16 mm. longis hirsutulis; sepalis lanceolatis obtusis ca. 4–5 mm. longis glabris sparse ciliatis, maturis ampliatis 6–8 mm. longis rubris; petalis subaequalibus flavis, unguibus ca. 2 mm. longis, laminis suborbicularibus 4–5 mm. longis irregulariter crenulatis; staminibus 8, filamentis ad basim 0.5 mm. connatis piloso-hirsutis 2.5 mm. vel 3.5 mm. longis; antheris 1.0–1.25 mm. longis, theca caudata apice bispinuloso-aristato, aristis introrse nectantibus, connectivo vix thecis excedenti; ovario glabro 2-loculari 3-stylari, stylis 2.5–3.5 mm. longis subulatis; drupis exigue carnosis ovatis, 1-pyrenis, 2-locularibus, 2 seminibus.

TYPE: small tree to 6 m. high, flowers yellow, mature sepals ampliate red, frequent in broken terrain west side of cumbre at 1000 m. alt. Cerro Yapacana, upper Río Orinoco, Terr. Amazonas, Venezuela, Jan. 3, 1951, *Bassett Maguire, R. S. Cowan & J. J. Wurdack 30704;* New York Botanical Garden. Paratypes: alt. 1000 m. Cerro Yapacana, April 1931, *E. G. Holt & E. R. Blake 707;* small tree 3–4 m. high, flowers yellow, calyx salmon pink when mature, frequent on cumbre Cerro Yapacana, alt. 1200 m., *Maguire, Cowan & Wurdack 30672;* tree 10 m. high, *Maguire, Cowan & Wurdack 30635; 30708; 30710,* sterile shoots.

Sipapoa hypoleuca is known from Cerro Yapacana only, but is there conspicuous on the upper slopes and cumbre.

3. Sipapoa ferruginea Maguire & Phelps, sp. nov.

Frutex vel arbor parva 4 m. alta; ramulis quadriangularibus dense rufo-hirsutulis, internodiis 3–25 mm. longis; foliis oppositis, laminis oblongo-ellipticis 3–4 (6) cm. longis 1–2 cm. latis coriaceis, supra glabris costa prominula, nervis non evidentibus, subtus dense rufo-sericeis granulari-glaucis, costa prominenti nervis non evidentibus, apice obtuso cuspidato, basi subobtusa; petiolorum partibus liberis 1–2 mm. longis dense sericeis, vaginis 5–8 mm. longis extus rufo-hirsutis intus densissime piloso-hirsutis, stipulis parvis intrapetiolaribus sed non connatis deltoideo-ovatis ca. 2 mm. longis, intus glabris, extus conspicue longo-hirsutis; inflorescentia floribunda terminali racemosa 5–10 cm. longa, rache pedicelloque rufo-hirsutulo; bracteis caducis non visis, bracteolis caducis deltoideo-ovatis 2–3 mm. longis subacutis sparse rufo-hirsutis, apice conspicue ciliolato; floribus zygomorphis, sepalis subaequalibus ovatis obtusis ca. 3 mm. longis carnosis ciliatis biglandularibus, maturis ampliatis 7–10 mm. longis late cordato-ovatis obtusis reticulo-venosis coccineis; petalis flavis ca. 6 mm. longis, unguibus ca. 2 mm. longis, laminis cordato-orbicularibus, minute eroso-crenatis; petalo quinto 9–10 mm. longo, ungue dilatato subconduplicato sursum ca. 2 mm. lato ca. 4 mm. longo rubello, lamina semiorbiculari 7 mm. lata 5 mm. longa subcrispulata; staminibus 5–6, filamentis ad basim dilatatis brevissime connatis, intus pilosis, 2 anterioribus ca. 2 mm. longis, 3 (4) interioribus 2.75 mm. longis, antheris introrsis, thecis oblongis ca. 1 mm. longis apice 2-spinuloso-aristato, aristis nectantibus incurvis, connectivo sursum dilatato 0.5 mm. projecto; ovario 2-loculari 3-stylari glabro, stylis subulatis erectis ca. 2 mm. longis; drupis exigue carnosis ovatis ca. 2.5 mm. longis, 1-pyrenis, 2-locularibus, 2 seminibus.

TYPE: sparsely or thickly branched shrub or small tree 1–4 m. high, flowers yellow, enlarging calyx turning red, dominant shrub in open areas, frequent at 2000 m. alt., Cerro Parú, Río Parú, Río Ventuari, Terr. Amazonas, Venezuela, Feb. 4, 1951, *R. S. Cowan & J. J. Wurdack 31233;* New York Botanical Garden. Paratypes: shrub to 7 feet high, flowers yellow, enlarged sepals red, one of the most abundant shrubs of the cumbre at 1700 m. alt., Cerro Parú, Feb. 1949, *Kathleen D. Phelps & C. B. Hitchcock 516;* shrub to 4 m. high, one petal larger crinkled, flowers yellow, calyx at first yellow at maturity becoming ampliate and bright red, dominant sabanita plant, West Escarpment, ca. 2000 m. alt., Jan. 31, 1951, *Cowan & Wurdack 31066; 31079; 31080; 31081;* Cerro Parú, Feb. 2, 1951, *Cowan & Wurdack 31150; 31171.*

4. **Sipapoa vestita** (Benth.) Maguire, comb. nov.

Coleostachys vestita Benth. Lond. Jour. Bot. 7: 124. 1848.
Diacidia vestita (Benth.) Benth. & Hook. Gen. Pl. 1: 253. 1862.

TYPE: "mountains of British Guiana, *Schomburgk sine no.*" Kew. Not seen.

Specimens collected by Tate (no. 563) on Cerro Duida were referred to *Diacidia vestita* (Benth.) Benth. & Hook. by Gleason.[25] Mr. Sandwith very kindly compared fragments of the Tate collection with the type of *Coleostachys vestita* Benth. at Kew. In his opinion the two are definitely conspecific. More recently an extensive series of this handsome little tree was obtained on Cerro Huachamacari, a sandstone mountain separated to the north from Cerro Duida by the valley of the Cunucunuma River.

Specimens examined: slender tree 20 feet high, flowers yellow, calyx persistent turning red, stream bank at Central Camp, alt. 4800 feet, summit Mount Duida, Amazonas, Venezuela, Dec. 28, 1928–Jan. 1, 1929, *Tate 563* (NY). Cerro Huachamacari, Terr. Amazonas, Venezuela, *Maguire, Cowan & Wurdack:* shrub or small tree to 5 m. high, flowers yellow, frequent along south escarpment, 1700 m. alt., *29806;* shrubby tree to 6 m. high, petals yellow, glands on calyx yellow, common on south escarpment face, 1300–1700 m. alt., *29858;* shrub 5 m. high, flowers yellow, mature calyx red, near summit of South Escarpment, 1700 m. alt., *29869;* shrub or small tree to 6 m. high, flowers yellow, common, elfin forest about Summit Camp, 1500 m. alt., *30091;* shrub to 2 m. high, flowers yellow, occasional, summit of East Escarpment, 1900 m. alt., *30111;* shrub 3 m. high, flowers yellow, occasional along West Escarpment, 1800 m. alt., *30221;* shrub or tree to 5 m. high, flowers yellow, common in low dense woodland along Caño de Dios, alt. 1500 m., *30252.*

5. **Sipapoa stipularis** Maguire & Phelps, sp. nov.

Frutex 3 m. altus; ramulis teretibus ca. 4 mm. diam. valde glaucis, internodiis (5) 10–35 mm. longis, alabastris sericeo-hirsuto-pilosis; foliis oppositis, laminis obovatis vel lanceolatis vel ellipticis vel obovatis, 5–8 (12) cm. longis 3.0–4.3 cm. latis, cum 5–8 jugis primariis nervis lateralibus, supra glabris nervis prominulis, subtus dense sericeis granulo-glaucisque, nervis prominulis, apice obtuso, basi obtusa, petiolorum partibus liberis 5–8 mm. longis, ad basim vaginae 6–8 mm. connatis, vaginis extus glabris glaucisque intus densissime sericeo-pilosis, stipulis intrapetiolaribus 5–8 mm. connatis foliaceis oblongo-ellipticis obtusis 3.0–3.5 (7.0) cm. longis 14–20 (28) mm. latis glabris rubro-tinctis, lateraliter connatis 3–6 mm., venis conspicuis; inflorescentia 10–18 cm. longa racemosa glabra glauca, bractearum subtendentium foliarium laminis 1–4 cm. longis, stipulis magnis, 1.0–5.0 cm. longis, bracteolis obovatis vel oblongis obtusis vel subtruncatis 2–4 mm. longis caducis; pedunculis ca. 2 mm. longis persistentibus, pedicellis ca. 8–15 (18) mm. longis tenuibus cum fructibus deciduis; floribus flavis 12–14 mm. diam., sepalis lanceolatis 4–5 mm. longis obtusis integris biglandularibus, maturis ampliatis 7–9 mm. longis chartaceis rubrovenosis; petalis ca. 6 mm. longis unguibus ca. 1 mm. longis, laminis orbiculari-ovatis, ca. 5 mm. latis; staminibus 6, filamentis ca. 2.5 mm. longis ca. 0.5 mm. crassis ad basim connatis hirsutisque intus, antheris ca. 1.75 mm. longis apice 2-spinuloso-aristato, aristis introrse nectantibus; ovario glabro biloculari tristylari, stylis subulatis ca. 2.5 mm. longis subobtusis; drupis subglobosis ca. 2.5 mm. longis pericarpio indurato nonverrucoso; seminibus ca. 2 mm. longis lenticulari-obovatis, testa albida membranacea, cotyledonibus aequalibus carnosis late oblongis lateraliter adpressis inflexis.

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[25] Bull. Torrey Club 58: 380. 1931.

TYPE: sparsely branched shrub 0.5–3.0 m. high, leaves glaucous above, upper surface concave, stipules with red veins, petals yellow, one longer with margins crimped, occasional in cumbre, Cerro Parú, West Escarpment, 2000 m. alt., Feb. 2, 1951, Río Parú, Río Ventuari, Terr. Amazonas, Venezuela, *R. S. Cowan & J. J. Wurdack 31200;* New York Botanical Garden. Paratypes: shrub about 5 feet high with bright red enlarged sepals; in fruiting condition only, rare on cumbre at 1600 m. alt., Serranía Parú, Río Parú, Río Ventuari, Amazonas, Venezuela, Feb. 1939, *Kathleen D. Phelps & C. B. Hitchcock 471;* little-branched shrub 0.5–3.0 m. high, flowers yellow, occasional, cumbre Cerro Parú, *Cowan & Wurdack 31112;* shrub, young leaves with red veins, infrequent, cumbre of Cerro Parú, *Cowan & Wurdack 31168;* shrub 1–3 m. high, occasional, cumbre Cerro Parú, *Cowan & Wurdack 31292.*

Lophanthera longifolia (Kunth) Griseb.

Shrub or small tree, riverine species at Danta Falls, Cuao River, November 19, 1948, *Maguire & Politi 27321.* Recorded hitherto from the drainage of the Rio Negro, Amazonas, Brazil; new for Venezuela.

Pterandra flavescens Maguire, sp. nov.

Frutex vel arbor parva; ramulis novellis dense rufo-sericeis; foliis oppositis, laminis elliptico-lanceolatis vel ellipticis, vel elliptico-oblanceolatis (3) 4–7 (10) cm. longis, (1) 2–4 cm. latis, supra glabris nervis impressis prominulis costaque exceptis pallidis sparse hirsutulis, subtus plus-minusve 8 jugis nervis lateralibus costaque conspicue rufo-sericeis, apice obtuso apiculato, basi acuta, petiolis 5–10 (15) mm. longis rufo-sericeis, stipulis ca. 4 mm. longis infrapetiolaribus connatis apice excepto; floribus 1–3 in fasciculis axillaribus; bracteis bracteolisque persistentibus subulato-lanceolatis ca. 2 mm. longis; pedicellis 18–22 mm. longis gracilibus dense rufo-hirsutulis; corollis pallido-flavescentibus ca. 12 mm. diam.; sepalis ca. 4 mm. longis ovatis valde hirsutulis biglandularibus, glandibus albidis ca. 2 mm. longis; petalis subaequalibus 6–7 mm. longis, unguibus ca. 1 mm. longis extus hirsutulis intus glabris sed ad basim subpilosis, laminis obovatis extus sparse rufo-sericeis marginibus glabris crispulatis, apice obtuso, basi acuta; staminibus 10, filamentis minusve liberis subaequalibus teretibus ca. 0.5 mm. diam. glabris ad basim intus brevipilosis; antheris subrectangularibus ca. 1 mm. longis 1.5 mm. latis, thecarum marginibus late alatis, alis ca. 0.4 mm. latis, connectivo ca. 0.2 mm. producto, ferme ad 90° angulos affixis; discis subpilosis; ovario dense hirsuto triloculari trilobato, loculis uniovulatis, uno abortivo; stylis ca. 3 mm. longis subulatis glabris ventraliter subapicibus; fructibus tripartibus carpellis semiglobosis ca. 4 mm. longis indehiscentibus, facie ventrali plana, sessilibus oblique affixis, stylo ventraliter carpello medio affixo; toro pyramidali ca. 2 mm. alto; seminibus 3–4 mm.

longis ovatis compressis, cotyledonibus complanatis convolutis linearibus ca. 6 mm. longis carnosis, radicula brevi.

TYPE: small tree 10 m. high, flowers pale yellow, occasional in savanna, along open banks of lower Caño Negro, alt. 1500 m., Cerro Sipapo, Amazonas, Venezuela, Jan. 1, 1949, *Bassett Maguire & Louis Politi 28104;* New York Botanical Garden. Paratypes: shrub to 3 m. high, petals pale yellowish, fruit deeply 2-3 lobed, savanna, Caño Negro, alt. 1500 m., Cerro Sipapo, Dec. 25, 1948, *Maguire & Politi 27946;* small shrub to 2 m. high, petals pale cream with red midvein, infrequent, marshes Caño Negro, 1500 m. alt., Cerro Sipapo, *Maguire & Politi 27692, 27692A.*

Pterandra flavescens is closely related to the low altitude rain-forest tree *P. arborea* Ducke, of Amazonas, Brazil. This latter species has larger leaves and smaller pink flowers. Fruiting material was not seen by Ducke.

Tetrapteris fimbriata Juss.

Flowers yellow, liana climbing to 20 m., opening along stream in montane forest, Intermediate Camp, Cerro Sipapo, 600 m. alt., Feb. 2, 1949, *Maguire & Politi 28749, 28783.*

POLYGALACEAE

Polygala sipapoana Wurdack, sp.nov. Sect. *Timutua*, Ser. *Tenues*.

Radix parva fibrosa. Caulis simplex vel ad apicem ramosus, ad 3.5 dm. longus, striatus, glaber. Folia lineari-oblonga vel lineari-obovata, acuminata vel obtusa sparse pellucido-punctata glabra 5-8 mm. longa 1.3-2.5 mm. lata, inferiora subverticillata superiora alterna. Racemi capitati vel breviter cylindrici 6-13 mm. longi et lati, floribus inferioribus dilapsis saepe ad 40 mm. elongati, sub racemo florente pedunculo incrassato. Flores rosei 4.5-5.0 mm. longi pedicellis 0.6-1.0 mm. longis. Sepala inaequalia; superiore ovato-elliptico obtuso vel breviter obtuso-apiculato 1.7-1.9 mm. longo 0.9-1.2 mm. lato, ad basim 4-8 maculas croceas gerenti; duo inferiora obtusa elliptica 1.2-1.3 mm. longa 0.5-0.6 mm. lata, ad basim maculas duas croceas gerentia; alae late ovatae vel ovato-ellipticae obtusae 4.1-4.4 mm. longae 2.9-3.1 mm. latae 3- mox 4-5-nerviae ad basim 1-3 maculas croceas gerentes. Petala lateralia 3.3-3.5 mm. longa 1.0-1.2 mm. lata ad carinam ⅓-adhaerentia; carina angusta ca. 3.5 mm. longa (crista inclusa) infra cristam croceo-maculata, crista e lobis 7-jugis, jugis ca. 1.2 mm. longis. Capsula ovato-elliptica obtusa haud emarginata ad septum croceo-maculata 2.5-2.9 mm. longa 1.6-1.9 mm. lata; semen conicum in maturitate brunneo-sericeo-comosum estrophiolatum 2.2-2.6 mm. longum (coma inclusa), coma 0.5-0.7 mm. longa.

TYPE: annual with pale to dark purple flowers, occasional, upper East Basin, Cerro Sipapo, Terr. Amazonas, Venezuela, alt. 1800 m., Jan. 14, 1949, *Bassett Maguire & Louis Politi 28352;* New York Botanical Garden. Paratype: purple flowered annual from wet places, Camp Savanna, alt. 1500 m., Dec. 6, 1948, *Maguire & Politi 27533.*

Closely related to three widespread species, *P. longicaulis* HBK., *P. variabilis* HBK., and *P. adenophora* DC., but resembling superficially the first of these most closely. From the first-mentioned species, *P. sipapoana* may be distinguished by the broadly ovate soon 4-5-nerved non-cuspidate wings and obtuse to bluntly mucronate upper outer sepal; from the second, it differs in the broader leaves and larger flowers; from both, *P. sipapoana* may be separated by the large ornate crest of 7 rather than 3-4 pairs of lobes and the estrophiolate seeds. *P. adenophora* differs in having narrower leaves, narrowly elliptic alae, and a much larger keel which exceeds the wings.

Bredemeyera floribunda Willd.

Liana 12–18 cm. diam., climbing to 20 m., flowers white with yellowish keel, 3 km. south of pump sta., Santa Barbara Rd. to Paso Maparita, State of Monagas, *Maguire, Kunhardt & Politi 27290.*

Bredemeyera lucida (Benth.) A. W. Benn.

Small tree, flowers white, savanna, Sanariapo, *Maguire & Maguire 28971.*

COMBRETACEAE

With the exception of *Buchenavia capitata* and *Terminalia obovata,* both of wide tropical South American distribution, all the members of the Combretaceae here reported and collected in the upper Orinoco basin of the Territorio Amazonas, Venezuela, are to be associated with species of the rain-forest of the hylea, for the most part that of the upper Rio Negro.

Buchenavia capitata (Vahl) Eichl.

Buttressed tree 30 m. high, 40 cm. diam., dense low-elevation forest vicinity Base Camp, Río Cuao, Cerro Sipapo, *Maguire & Politi 27370.* Widespread in tropical South America.

Buchenavia suaveolens (Spruce) Eichl.

Tree 10 m. high, flowers brownish, occasional along streamside, Caño Yapacana below Cerro Yapacana, Jan. 6, 1951, *Maguire, Cowan & Wurdack 30763, 30765.* New to Venezuela. Previously known by the type collection, Rio Negro inter Barra et Barcellos, *Spruce 1882;* and Casiquiare, Vasiva et Pacimoni, *Spruce 3198.*

Buchenavia reticulata Eichl.

Tree to 20 m. high, flowers brown, frequent riverine tree, Caño Yapacana, vic. trail to Cerro Yapacana, Jan. 6, 1951, *Maguire, Cowan & Wurdack 30760, 30794.* New to Venezuela.

B. reticulata is a handsome and conspicuous tree overhanging the streamside between the "port" for the trail to the mountain and the Orinoco River. Flowering begins before or at the time of vernation. Leaf size is variable. Our specimens match very well the fruiting type from the Casiquiare, Vasiva et Pacimoni, *Spruce 2453,* hitherto apparently the only known collection of the species.

Ramatuella HBK. Nov. Gen. 7: 196. *pl.* 656. 1825. Genotype *R. argentes* HBK.

Ramatuella is a small genus adequately marked by its more or less woody, strongly equilaterally (4–)5-winged indehiscent fruit. The first described species, *R. argentea,* was collected by Humboldt and Bonpland along the Río Atabapo in Terr. Amazonas, Venezuela. Spruce later discovered a second species, *R. virens,* near the mouth of the Casiquiare along the Rio Negro in Brazil. Ducke next collected the third species, *R. crispialata,* from the Rio Negro. More recently Krukoff and Schultes have recollected *R. argentea* in the Rio Negro basin in Brazil and in Colombia, and Schultes has collected *R. virens* again from the type locality.

Now, by our own material from Terr. Amazonas, Venezuela, we add a new species and a new variety to the genus, and an additional record for Venezuela.

Key to the Species of *Ramatuella*

1. Fruit prominently beaked, the rostrum (2) 3–5 mm. long.
    2. Wings of the fruit deltoid-ovate, abruptly narrowed at the summit and at the base of fruit body; beak ca. 3–5 mm. long; leaves oblanceolate 5–9 cm. long, densely tomentulous-subsericeous beneath. 1. *Ramatuella argentea.*
    2. Wings of fruit of same width from base of fruit body to beak.
        3. Wings ample, thin; petioles and costa of the leaves glabrous or mi-

nutely and sparsely puberulent, leaf blades oblanceolate, (6–)8–12 cm. long, 1.8–4.8 cm. wide, petioles slender, 5–15 mm. long. 2. *Ramatuella virens.*

3. Wings narrow, thick, strongly undulate; petioles and costa puberulent, cuticle silvery exfoliating, leaf blades broadly oblanceolate, 10–12 cm. long, (4–)6–7 cm. wide, petioles coarse, 20–30 mm. long. 3. *Ramatuella latifolia.*

1. Fruit not at all beaked or the rostrum 2 mm. or less long.

2. Leaf base acute, petioles 8–12 mm. long, wings of fruit crisped. 4a. *Ramatuella crispialata* var. *crispialata.*

2. Leaf base obtuse, petioles 16–20 mm. long; wings of fruit undulate. 4b. *Ramatuella crispialata* var. *obtusa.*

1. Ramatuella argentea HBK. Nov. Gen. 7: 197. *pl.* 656. 1825.

Besides the type collection of Humboldt & Bonpland from the upper Río Atabapo, Terr. Amazonas, Venezuela, the species is now known from the basin of the upper Rio Negro, Amazonas, Brazil, and Río Vaupés, Colombia.

2. Ramatuella virens Spruce ex Eichl. in Mart. Fl. Bras. 14^2: 100. 1867.

Riverine tree 10–15 m. high, fruit gray-brown, occasional, along Caño Yapacana below "the port" for Cerro Yapacana, Terr. Amazonas, Venezuela, January 6, 1951, *Maguire, Cowan & Wurdack 30764.* New to Venezuela.

R. virens was originally collected by Spruce (no. 3758) from the junction of the Rio Guainia and the Casiquiare. A second collection from the type locality was recently made by Schultes & Lopez (no. 9359). Now the above collection, apparently the third, extends the known range into the region of the upper Orinoco.

3. Ramatuella latifolia Maguire, sp. nov.

Arbor parva 10 m. alta; ramulis fulvo-puberulis, glabrescentibus per cuticulam scariosam exfoliatam; foliis approximatis alternatis, laminis chartaceis late oblanceolatis (8–)10–14 cm. longis 4–7 cm. latis glabris costa minute puberula excepta, apice rotundato aliquando retuso, basi acuta, petiolo (1–)2.0–2.5 cm. longo sparse puberulo glabrescenti per cuticulam conspicue scariosam exfoliatam; inflorescentiis axillaribus spicato-capitatis 5–7 cm. longis dense fulvo-puberulis; floribus non visis; fructibus nucamentaceis ovoideo-lanciformibus vel obturbinatis 14–18 mm. longis 6–10 mm. latis fulvo-velutinosis (4–)5-alatis, alis 2–3 mm. latis subligneis valde crispatis, rostro prominenti 3–5 mm. longo.

TYPE: small tree 10 m. high, post-fruiting, sandy flood banks of caatinga 15 km. above San Fernando, Río Atabapo, Terr. Amazonas, Venezuela, 125 m. alt., October 17, 1950, *Bassett Maguire 29258;* New York Botanical Garden.

R. latifolia finds its closest relative in *R. virens,* which has much narrower leaves, shorter petioles, more ample fruit, is less pubescent, and lacks completely the extraordinary character of cuticular exfoliation.

4. Ramatuella crispialata Ducke, Arch. Inst. Biol. Veg. [Río de Janeiro] 2: 65. 1935.

4a. Ramatuella crispialata Ducke var. crispialata.

Known from "caatinga ad Igarapé Juraxare affl. Rio Vaupés (Amazonas), Brazil," *A. Ducke,* November 2, 1932 *(H.J.B.R. 25024),* a later collection from the type station, *A. Ducke 221,* September 29, 1935, and more recently from El Castillo, Rio Negro, Vaupés, *Schultes & Lopez 9298a.*

4b. Ramatuella crispialata Ducke var. obtusa Maguire, nar. nov.

Arbor parva; ramulis lobatis dense griseo-velutinis; foliis alternatis, laminis chartaceis integris oblongo-oblanceolatis (8–)9–13 cm. longis (3–)4–7 cm. latis glabris costa excepta, apice rotundato aliquando leviter emarginato, basi rotun-

data vel obtusa, petiolo 15–25 cm. longo griseo-velutino; inflorescentiis axillaribus spicato-capitatis 8–10 cm. longis griseo-velutinis; floribus non visis; fructibus nucamentaceis rhomboideis vel oblongo-ellipticis vel ovatis griseo-velutinis 15–20 mm. longis 10–15 mm. latis valde (4–)5-alatis, alis 4–6 mm. latis subligneis undulatis, rostro brevissimo 0.5–2.0 mm. longo aliquando non evidenti.

TYPE: tree to 7 m. high, fruit gray-brown, occasional in caatinga around Yapacana Savanna I, 125 m. alt., Cerro Yapacana, Orinoco River, Terr. Amazonas, Venezuela, January 7, 1951, *Bassett Maguire, R. S. Cowan & John J. Wurdack 30796;* New York Botanical Garden.

The var. *obtusa* has been interpreted as belonging to *R. crispialata* because of the broadly-winged barely rostrate fruit, grayish or brownish velutinous pubescence, and general leaf form that they have in common. There are numerous elements of difference which suggest that ultimately, when sufficient material is at hand, the two populations may have to be considered specifically distinct.

Terminalia obovata (R. & P.) Steud.

Small riverine tree along the Orinoco, 30 km. below La Urbana, Edo. Bolivar, Venezuela, March 14–15, 1949, *Maguire & Maguire 29017.* Widespread in tropical South America.

Terminalia yapacana Maguire, sp. nov.

Arbor parva 12 m. alta; ramulis glabris; foliis terminaliter approximatis alternatis, laminis ovato-oblanceolatis vel oblongo-oblanceolatis integris 3–8 cm. longis 1.5–3.5 cm. latis chartaceis glabris, nervis lateralibus prominulis in nervo marginali collectivo, apice obtuso aliquando aliquantum retuso, basi acuta vel acuminata; petiolis 2–5 mm. longis 3–4 mm. latis; spicis axillaribus 6–10(–12) cm. longis glabris vel sparsissimis puberulis; floribus sessilibus, hypanthiis crateriformibus 4–5 mm. longis, stipite 0.5–1.0 mm. longo dense puberulo, limbo campanulato ca. 2. mm. longo puberulo, lobis triangularibus acutis extus puberulis intus subpilosis; corolla obsoleta; staminibus 10, 2-cyclis, filamentis teretibus glabris, antisepalis 5 in basi limbi affixis ca. 5 mm. longis, alternisepalis 5, in sinibus affixis ca. 3 mm. longis; ovario inferiore lineari ca. 2 mm. longo (4–)5-sulcato dense puberulo; stylo subulato ca. 5 mm. longo, stigmate truncato papilloso; fructibus nucamentaceis ovato-oblongis vel elliptico-oblongis 6–8 mm. longis 5–6 mm. latis sparse puberulis aequaliter quinquealatis, alis chartaceis 1.5–2.0 mm. latis.

TYPE: tree 8 m. high, fruit brownish-red, frequent, dominant tree in and about periphery of Yapacana Savanna III, 125 m. alt., January 1, 1951, Terr. Amazonas, Venezuela, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30590;* New York Botanical Garden. Paratype: shrub or tree to 12 m. high, frequent, dominant savanna tree, particularly about border, Yapacana Savanna III, 125 m. alt., *Maguire, Cowan & Wurdack 30480.*

Terminalia yapacana finds its closest congener in *T. quintalata* Maguire of the Kaieteur savanna and escarpment. The two are very similar in general character and habitat, the latter being a tree some 20–25 m. high, with much larger leaves 5–9 × 11–17 cm., larger fruit 8 × 8–10 mm. in size, and filaments only about 2.5 mm. long. It is interesting to note that *T. yapacana,* so far as known, is restricted to the savannas about Cerro Yapacana on the western edge of the Guayana Highland, while its nearest relative occupies a similar habitat on the Kaieteur Savanna on the easternmost escarpment of the Guayana Highland. No similar or related species are known over the intervening 700 km. of the sandstone region.

MELASTOMACEAE[26]

Rhynchanthera grandiflora (Aubl.) DC.

Marsh, Puerto la Cruz to Santa Barbara Camp, State of Monagas, *Maguire, Kunhardt & Politi 27214a.* Usually at low altitudes, French Guiana to eastern Colombia and southward to Bolivia.

Aciotis laxa (Rich.) Cogn.

Annual with pink flowers, near Base Camp on Rio Cuao, *Maguire & Politi 27366.* A common species of the Amazonian rain forests.

Aciotis purpurascens (Aubl.) Triana.

Annual with pink flowers, near Base Camp on Río Cuao, *Maguire & Politi 27367.* The commonest species of the genus throughout the Amazonian rain forests.

Desmocelis villosa (Aubl.) Naud.

Annual with pink petals, moist grassy places, sandy soil along stream, under Mauripa, State of Monagas, *Maguire, Kunhardt & Politi 27296.* Widely distributed at low altitudes in tropical South America.

Macairea rigida Benth.

Shrub up to 2 m. tall with purple or red petals, on Caño Profundo, Cerro Sipapo, *Maguire & Politi 28324;* on Cerro Culebra of Cerro Duida, altitude 1440 m., *Maguire & Maguire 29105;* on a ridge of Cerro Marahuaca, altitude 1350 m., *Maguire & Maguire 29166.* Endemic to the mountains of southern Venezuela.

Acisanthera recurva (Rich.) Griseb.

Annual, petals purple, stamens dark purple, under Mauripa in sandy soil, moist grassy places along stream, State of Monagas, *Maguire, Kunhardt & Politi 27297.* Widely distributed in tropical South America, mostly at low altitudes, also in Costa Rica.

Comolia lythrarioides (Steud.) Naud.

Subherbaceous perennial up to 5 dm. tall, flowers purple, mossy wet banks along rocks, Danta Falls, Río Cuao, *Maguire & Politi 27351.* Venezuela, Trinidad and the Guianas.

Comolia villosa (Aubl.) Triana.

Weak subshrub up to 5 dm. tall, flowers pink, Murcielago Falls, Río Cuao, *Maguire & Politi 27311.* Lowlands of Venezuela and the Guianas.

Tibouchina striphnocalyx (DC.) Gl.[27]

An abundant shrub up to 3 m. tall at several locations on Cerro Sipapo, *Maguire and Politi;* wet ledges and cliffs, precipitous east slopes, 1440 m., *27830;* along water course, upper East Basin, 1500–1650 m., *28463;* upper Caño Negro and north branch of Caño Profundo, *28263;* western slopes, 1650 m., *27600;* flowers purple, shrub 2 m. high, occasional, Upper Camp Savanna, 1500 m., *28694.* The flowers were noted once as purple and once as white. Endemic to this general region.

Tibouchina kunhardtii Gl.

A common shrub in wet ground on the summit of Sipapo, *Maguire & Politi;* marsh about pool, Caño Negro, *27713;* border of thickets near the summit, *28126;*

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[26] by H. A. Gleason.

[27] For a review of the genus, see H. A. Gleason, The Genus *Tibouchina* in southern Venezuela (Phytologia 3: 238–243. 1950).

upper East Basin, 1500–1650 m., *28455;* east slope of Peak I, 1650 m., *27639;* dry rocks, summit of Peak I, 1800 m., *27667 B;* boggy area near summit of West Peak, 1650 m., *27794 A.* Endemic.

Tibouchina sipapoana Gl.

Weak or reclining shrub to 5 dm. high, 1 m. diam., petals rose-purple, frequent in savannas, southeast slope North Peak I, 6000 ft. alt., Cerro Sipapo, Amazonas, Venezuela, December 12, 1948, *Maguire & Politi 27658.* Endemic.

Attention has already been directed, in my report on the collections of Dr. Steyermark, to the several peculiar features of structure which separate the small genus *Acanthella* from most other genera of the Tribe Merianeae. In the same report a second species of the genus was described, differing in interesting features from *A. conferta,* which for a century was the only known species. Dr. Maguire has re-collected these two and has discovered two additional ones as described below.

Acanthella conferta (Vell.) Cogn.

On granite rocks at Danta Falls, Río Cuao at low altitudes, *Maguire & Politi 27323.*

Acanthella pulchra Gl.

On granite outcrops at intermediate elevations on Cerro Sipapo, *Maguire & Politi 27472.* Compared with the type, the leaves of this plant are considerably narrower, oblanceolate, up to 45 mm. long and 18 mm. wide.

Acanthella montana Gl., sp. nov.

A. confertae affinis sed ramosior, internodiis ubique brevissimis, foliis multo minoribus, seminum ala tenuissime scariosa.

Much branched depressed shrub, the internodes all very short, 0.7–1.5 mm. long, setiferous at the nodes, the setae 1.5–3 mm. long and persistent far below the leaves. Leaves crowded in clusters of about a dozen, on petioles about 1 mm. long; blades firm, oblanceolate, up to 13 mm. long by 4 mm. wide, tipped with a subulate spine nearly 1 mm. long, acute at both ends or somewhat cuneate to the base, entire, glabrous, 3-nerved, the lateral nerves obscure, the secondaries obscure and crooked. Flowers not well displayed on the one available specimen, the hypanthium and sepals apparently very like those of *A. conferta,* the stamens also the same; petals reported as yellow. Seeds concave, thin, about 4 mm. long by 2.5 mm. wide, the wing about 0.7 mm. wide, exceedingly thin and hyaline.

TYPE: from sandstone rocks on the summit of Cerro Sipapo, 1900 m. alt., Amazonas, Venezuela, *Bassett Maguire & Louis Politi 27550;* New York Botanical Garden.

Acanthella plicata Gl., sp. nov.

Frutex parce ramosus, internodiis glabris, nunc elongatis, nunc brevissimis; folia arcte conduplicata, coriacea, late obovata; seminum ala coriacea opaca.

Widely branched shrub up to 3 m. tall; internodes of the long shoots 5–8 cm. long, obscurely angled; internodes of the short shoots 2 or 3, each about 1.5 mm. long; nodal setae none. Petioles stout, 4–10 mm. long; blades coriaceous, permanently closely folded, obovate-oblong, up to 6 cm. long and 4 cm. wide, broadly rounded to a minutely retuse tip with a blunt tooth in the sinus, entire, rounded at base, glabrous, 3-nerved, the lateral pair submarginal and very obscure. Flowers solitary, on a peduncle 10–12 mm. and a pedicel 6–8 mm. long. Seeds concavely flattened, about 5 mm. long and 4 mm. wide, the wing firm, opaque, nearly 1 mm. wide.

TYPE: on granite rocks at low altitudes, Río Cuao between Cerro Sipapo and the Orinoco River, Amazonas, Venezuela, *Bassett Maguire & Louis Politi 29027;* New York Botanical Garden. Even when fresh, the leaves cannot be unfolded without tearing.

The four known species may be distinguished by the following key:

Stem bearing stiff setae at each leaf-bearing node; leaves acute, tipped with a short stiff spine; hypanthium glandular-hirsute.
  Seeds with firm opaque wing; long and short shoots well differentiated; leaf-blades 1–3 cm. long; plants growing on granite at low altitudes. *A. conferta.*
  Seeds with very thin hyaline wing; all internodes very short; leaf-blades up to 13 mm. long; plants growing on sandstone at high altitudes. *A. montana.*

Stem without nodal setae; both long and short shoots developed; leaves broadly rounded at the summit, not setose-tipped; hypanthium apparently glabrous; plants growing on granite.
  Leaves flat, spatulate to obovate-oblong; seeds 5–7 mm. long. *A. pulchra.*
  Leaves permanently folded, very broadly obovate-oblong; seeds 4–5 mm. long. *A. plicata.*

Graffenrieda cinnoides Gl., sp. nov.

Frutex pubescens; folia longe petiolata, ovato-oblonga, 5-pli-nervia, subacuminata, basi obtusa, supra glabra subtus venis pubescentia, pagina grisea atomis nitentibus; flores 4–5-meri, breviter pedicellati in panicula parva; sepala triangulari-acuminata.

Sparsely branched shrub. Stem thinly but closely brown-tomentulose with stout, crooked, barbellate hairs; similar pubescence of the petioles (15–28 mm. long) and the primary veins of the leaves. Leaves thin, ovate-lanceolate, subacuminate to a blunt point, entire, obtuse at base, 5-pli-nerved, glabrous above, sparsely pubescent on the primaries beneath, the actual surface grayish with minute shining particles. Flowers 5-merous, in 3-flowered clusters, on pedicels about 1 mm. long, forming a small loose panicle about 5 cm. long. Fruiting hypanthium 2.6 mm. long, closely dotted with minute shining particles. Sepals separate to the torus, thin, triangular-acuminate, 1.4–1.8 mm. long and about as wide. Petals lacking. Filaments about 4.3 mm. long; anthers subulate, arcuate, about 3.5 mm. long; connective prolonged into a minute erect spur. Capsule 2–3-celled.

TYPE: summit of Cerro Sipapo, *Bassett Maguire & Louis Politi 28180;* New York Botanical Garden. The plant has a strong habital resemblance to *G. cinna* Macbr., a plant of low altitudes in Peru, but differs in the nearly glabrous leaves and sessile flowers.

Graffenrieda fantastica Schultes & Smith.

Summit of Cerro Sipapo, *Maguire & Politi 27542, Maguire & Politi 27782;* otherwise known only from the type locality on Mount Chiribiquete, Colombia.

Graffenrieda pedunculata Gl., sp. nov.

Frutex, caulibus tumidis glabris; folia oblongo-lanceolata vel oblongo-oblanceolata, obtusa, basi angustata, 1-nervia, supra glabra, subtus argentea; pedunculus elongatus; flores 4-meri sessiles; calyx calyptriformis, circumscissus; petala magna.

Low branching shrub with thick stems and short internodes, each branch bearing 2 or 3 pairs of leaves near the summit. Petioles up to 8 mm. long. Blades firm, oblong-lanceolate to oblong-oblanceolate, up to 6.5 cm. long and 1.5 cm. wide, obtuse, entire, gradually tapering to the base, 1-nerved, above glabrous, yellowish-green, and somewhat shining, beneath silvery with a fine close indument. Peduncle slender, erect, 8–15 cm. long, bearing a terminal glomerule of 4–8 sessile 4-merous flowers and sometimes a smaller subterminal 4-flowered glomerule. Hypanthium cup-shaped, 5.4 mm. long, very thinly gray-tomentulose. Calyx in bud conic, blunt, about as long as the hypanthium and with similar indument, circumscissile about 2.6 mm. from the torus. Petals rotund-obovate, 10 mm. long, 11 mm. wide. Stamens isomorphic; filaments 3.6–4.2 mm. long; anthers slightly arcuate, subulate, 6.6–6.9 mm. long; spur conic, 0.2 mm. long. Ovary superior, apparently 2-celled, glabrous except for a few minute delicate hairs at the summit; style 11 mm. long; stigma punctiform.

TYPE: from savannas at the summit of Cerro Sipapo, *Bassett Maguire & Louis Politi 28669;* New York Botanical Garden. Paratypes: *Maguire & Politi* numbers *27365, 27522,* and *27932.*

Graffenrieda versicolor Gl., sp. nov.

Frutex cauli crasso tenuiter tomentuloso; folia petiolata, lanceolata vel elliptica, coriacea, utrinque obtusa, 1-nervia, supra glabra, subtus tenuiter tomentosa brunnea vel argentea; panicula elongata; flores 5-meri breviter pedicellati; hypanthio obconico; calyx calyptratus, ad anthesin irregulariter ad torum ruptus; petala triangulari-obovata; antherae subulatae arcuatae; calcar breve conicum; ovarium summo 10-aristatum.

Sparingly branched shrub, the thick stems, petioles, lower leaf-surface, panicle, and hypanthium densely but very thinly tomentulose. Petioles stout, 1–1.5 cm. long. Blades coriaceous, lanceolate to elliptic, up to 9.5 by 3 cm., obtuse at both ends, 1-nerved, entire, glabrous above. Panicle terminal, peduncled; flowers 5-merous, on stout pedicels 1–2 mm. long, in terminal glomerules and also in a few axillary short-stalked glomerules. Hypanthium narrowly obconic, 5 mm. long, thick-walled; calyx calyptrate, at anthesis irregularly ruptured to the torus into more or less ovate-triangular lobes up to 4 mm. long. Petals broadly triangular-obovate, 9 mm. long, 8 mm. wide. Stamens isomorphic; filaments flattened, 4–4.7 mm. long; anthers arcuate, subulate, about 6.5 mm. long; spur conic, erect, 1.25 mm. long. Ovary superior, narrowly conic, prolonged around the style-base into 10 erect subulate awns.

TYPE: from savannas on the summit of Cerro Sipapo, *Bassett Maguire & Louis Politi 27948-A;* New York Botanical Garden. Paratypes: *Maguire & Politi 27531* and *27948;* the latter has leaves up to 12 cm. long and 6 cm. wide and panicles as much as 2 dm. long.

At least three other species of Graffenrieda were collected without flowers and could not be identified from foliage with any species known from the region. Their *27879,* from intermediate altitudes on Cerro Sipapo, is a tree with very large ovate-lanceolate leaves densely brown-tomentose beneath and a large panicle with widely diverging branches. *Maguire & Politi 27936* and *27576* represent a small tree with very large elliptic leaves glabrous beneath and a huge, widely branched panicle; it closely resembles *G. boliviensis* Cogn. in foliage and habit. *Maguire & Politi 28272* and *28478a* are from trees at intermediate elevations and summit of Cerro Sipapo with broadly ovate, strongly 9-pli-nerved leaves; the calyx apparently ruptures irregularly and the persistent lobes become indurate in fruit.

Salpinga secunda Schr. & Mart.

Flowers white, infrequent in lowland forests south of Culebra, north end of Cerro Duida, *Maguire & Maguire 29149;* an Amazonian species.

Salpinga maguirei Gl. sp. now.

Caulis herbaceus 4-angulatus fere 4-alatus, densissime brunneo-lepidotus; folia petiolata ovata membranacea subacuminata; spica secunda longe pedunculata, floribus subsessilibus.

Stems herbaceous, up to 3 dm. long, densely covered with pale brown, sessile, peltate, circular, scarious scales about 0.7 mm. wide; similar scales occur on the petioles and very sparsely on the primary veins. Leaves very thin, ovate, up to 75 mm. long by 48 mm. wide, subacuminate, obscurely crenate and with a short bristle in each sinus, at base rounded or subcordate to a triangular petiole-summit, 3–5-nerved, the nerves narrowly 2-winged beneath, naked at base of the blade, glabrous on both sides, beneath very minutely white-pustulate. Peduncle 3–5 cm. long, pale yellowish-gray, above glabrous, at base with a very few scales. Flowers as many as 7, 5-merous, apparently sessile but actually on a 10-winged pedicel about 2 mm. long and merging gradually into the hypanthium. Hypanthium narrowly obconic, glabrous, pale, about 5 mm. long, conspicuously but obtusely 10-winged. Calyx-tube prolonged about 0.5 mm.; sepals very thin, spreading, triangular-acuminate, 4.7 mm. long from the torus. Petals pink, at least 5 mm. long. Stamens dimorphic; filaments flat, glabrous; anthers slender, the larger about 5 mm. long, the smaller about half as large; connective prolonged at base into an antrorse obtuse appendage about 1.2 mm. long and a very minute, retrorse, flattened scale.

TYPE: from wet cliffs on the escarpment of Cerro Sipapo, altitude 900–1200 m., *Bassett Maguire & Louis Politi 27503;* New York Botanical Garden. Distinguished immediately from the few other known species of the genus by its lepidote indument.

In respect to its high degree of endemism, the genus *Macrocentrum* is without doubt remarkable. For about a century it was known by three species only, and of these one was represented by a single specimen collected by Appun on his trip to Roraima. Within the last three decades exploration has penetrated far into the mountains of southern Venezuela, British Guiana, and Surinam, Appun's species has again been collected and no fewer than eleven others have been discovered. Most of them grow on wet rocks in the immediate vicinity of waterfalls. At present it would seem that every mountain explored has its endemic species on its own numerous cataracts, but, as a matter of fact, various species are now being found on a second, or even a third mountain, although additional local species continue to appear. The few species of the Surinam mountains are still unknown in British Guiana or southern Venezuela. Dr. Maguire collected four species on Cerro Sipapo, one of which was previously known from Duida, while three were undescribed. Two of these have a habit totally unlike any other known species, so unlike that I was unable to refer them to a genus on my first inspection. When the Duida species were first described, I drew up a key to distinguish all the species known at that time. A similar key to the fourteen species now known is presented below and reference to it is suggested for the diagnostic characters and supposed relationships of the species. It seems that the number of parts in the flower may be of little taxonomic significance, inasmuch as Dr. Maguire found 4-merous and 5-merous flowers in the same colony. The key below is based primarily on the three very different types of inflorescence found in the genus.

Macrocentrum angustifolium Gl., sp. nov.

Frutex humilis; folia isomorpha, anguste elliptica, incurvo-denticulata, glabra; flores 5-meri, breviter pedicellati in axillis foliorum superiorum, ad basim a jugo foliorum parvorum bracteati; stamina isomorpha; antherae lineares; connectivum basi in calcar retrorsum breve productum.

Widely branched half-shrub up to 3 dm. tall, the spreading branches very numerous; internodes 4–7 mm. long, glabrous, with 2 shallow lateral furrows. Leaves isomorphic, linear-elliptic to linear-oblanceolate, up to 18 mm. long and 3 mm. wide, acute, tapering to a sessile petiole-like base, entire below, irregularly dentate in the distal half or two-thirds with a few small incurved teeth, glabrous, 1-nerved or with very faint indication of a pair of lateral nerves; secondaries obsolete. Flowers 5-merous, solitary at the end of short (3 mm.) minutely scabrellate peduncles; each peduncle solitary and terminal but apparently axillary, subtended at its very base by a pair of reduced leaves, the stem proliferating from the axil of one of the adjacent foliage-leaves. Hypanthium cup-shaped, thin-walled, about 2.5 mm. long, rather obviously 10-nerved, scabrellate opposite the torus. Calyx-tube prolonged 0.4 mm.; sepals 4.8 mm. long from the torus, from a triangular base, soon narrowed to a subulate tip. Petals "white to pink," ovate, about 6.5 mm. long. Stamens isomorphic but slightly unequal; filaments flat, glabrous; anthers linear, about 3 mm. long, prolonged at base into a terete connective 0.5 mm. long and below the summit of the filament into a straight, retrorse, subulate, dorsal spur 0.5 or 1 mm. long. Ovary superior, subglobose, tipped with 5 erect fleshy lobes; style slender; stigma punctiform.

TYPE: on wet rocks along Savanna Creek, summit of Cerro Sipapo, *Bassett Maguire & Louis Politi 27540;* New York Botanical Garden. Paratype: *28223* is identical: it is described as a perennial subshrub 2–4 dm. tall, leaves shining green, flowers pink, stamens pale yellow, along stream, Caño Profundo, North Branch, summit of Cerro Sipapo.

Macrocentrum anychioides Gl., sp. nov.

Planta annua, simplex vel ramosa, caulibus ad nodos setosis; folia isomorpha, oblongo-elliptica, breviter petiolata, sparse ciliata, glabra; flores 4-meri, breviter pedicellati in axillis foliorum superiorum, basi jugo foliorum reductorum bracteati; stamina isomorpha; antherae lineares; connectivum basi in calcar breve retrorsum productum.

Annual, according to Maguire, sparsely branched, 1–2 dm. tall; internodes mostly 4–6 mm. long, glabrous; nodes mostly bearing 2 pairs of stipule-like bristles 1–1.5 mm. long. Petioles 2–3 mm. long. Blades isomorphic, oblong-elliptic, up to 1 cm. long and 4 mm. wide, obtuse, acute at base, sparsely ciliate with a few bristles up to 1 mm. long, otherwise glabrous, 1-nerved. Flowers 4-merous, solitary and terminal; peduncle 2 mm. long, subtended by two small leaves at base; pedicel about 2 mm. long, merging gradually into the hypanthium. Hypanthium conic, 2.5 mm. long, narrowly 8-winged, each wing terminating in an erect gland-tipped bristle, otherwise glabrous. Calyx-tube about 0.3 mm. long; sepals broadly depressed-semicircular, 1.5 mm. long from the torus. Petals purple, oblong, 14 mm. long. Stamens isomorphic; filaments very long and slender; anthers linear-subulate, 3.5 mm. long, including the very short slender retrorse spur.

TYPE: growing in deep shade on wet rocks along Savanna Creek, summit of Cerro Sipapo, *Bassett Maguire & Louis Politi 27539;* New York Botanical Garden. Paratype: *28222* is identical, from moist rocky banks, Caño Profundo, north branch, summit of Cerro Sipapo.

Macrocentrum rubescens Gl., sp. nov.

Planta parce ramosa, suffruticosa, caulibus sparse minuteque glandulosis, ad nodos setosis, ceterum glabris; folia petiolata, ovato-lanceolata vel elliptica, obtusa, sparse ciliata, 1-nervia; flores 4-meri, solitarii, breviter pedunculati; stamina isomorpha; antherae subulatae, connectivo infra apicem filamenti in calcar breve dorsale producto.

Stems suffruticose, 5–20 cm. tall; internodes up to 3 cm. long, reddish, glabrous except for a few minute sessile glands; nodes bearing 2 pairs of bristles 1–4 mm. long. Petioles slender, up to 4 mm. long, channeled above, reddish-glandular. Blades isomorphic, ovate-lanceolate or elliptic, up to 25 mm. long and 10 mm. wide, obtuse, at base acute or somewhat cuneate, sparsely ciliate, glabrous or very sparsely pilose above, glabrous and somewhat paler beneath, 1-nerved. Peduncles solitary, 1-flowered, 2 mm. long, strongly 3-angled, bearing 2 subulate bracteoles at the summit. Flower sessile, 4-merous. Hypanthium obconic, 3.3 mm. long, 8-winged, each wing bearing 2 or 3 short cilia. Calyx-tube 0.5 mm. long; sepals somewhat flaring, broadly depressed-semicircular, much wider than long, very thin and minutely erose toward the summit. Stamens isomorphic; filaments slender but flat; anthers subulate, 3.3 mm. long; thecae straight, 2.4 mm. long; connective prolonged 0.4 mm. to the summit of the filament and below the filament into a straight retrorse spur about 0.5 mm. long.

TYPE: cliffs in wet montane mossy forest, Phelps Camp to North Savanna, Cerro Sipapo, *Bassett Maguire & Louis Politi 27761;* New York Botanical Garden. Paratypes, Cerro Sipapo: *Maguire & Politi 27504, 27538, 27620, 27621,* and *27874.* The species is apparently well distributed on the mountain from the base of the escarpment to the summit and was collected six times by Dr. Maguire.

Macrocentrum glandulosum Gl.

Flowers red, wet cliffs, Camp Savanna, Cerro Sipapo, alt. 4000 ft., *Maguire & Politi 27495;* dry rocks, mixed woodland, base of escarpment, upper Camp Savanna, 1350 m., *Maguire & Politi 27666;* moist rocks in mixed forest, north escarpment of Cerro Sipapo, alt. 1400 m., *Maguire & Politi 27890;* on rocks at Culebra Peak, Cerro Duida, alt. about 1500 m., *Maguire & Politi 29082, Maguire & Politi 29103.* Hitherto known from Cerro Duida.

The fourteen species may be distinguished by the following key.

Flowers solitary or rarely two in each inflorescence as it arises from the base of a single leaf.

Stem scarcely developed; leaves crowded on short internodes; flowers long-peduncled, held well above the leaves.

Leaves spatulate, long-tapering to the very short petiole, obtuse, pilose on both sides. *M. droseroides* Triana.

Leaves ovate-oblong, rounded at base, on distinct petioles up to 7 mm. long, glabrous beneath, pilose above. *M. parvulum* Gl.

Stem well developed, the leaves separated by distinct internodes; flowers on pedicels only 1–3 mm. long.

Stem glabrous; sepals notably longer than wide, acuminate; flowers 5-merous.

Petioles 5–8 mm. long; leaves ovate-lanceolate, a third to a fourth as long as wide; delicate herb. *M. pusillum* Gl.

Petioles essentially lacking; leaves linear-elliptic to narrowly oblanceolate, about a sixth as wide as long; low repeatedly branched shrub. *M. angustifolium* Gl.

Stem with nodal setae; sepals depressed-semicircular; flowers 4-merous.

Internodes hirsute on the angles. *M. minus* Gl.

Internodes glabrous.

Stem and petioles sparsely beset with minute reddish glands; leaves thin, reddish beneath, up to 25 mm. long. *M. rubescens* Gl.

Stem and petioles glandless; leaves firm, green, up to 1 cm. long. *M. anychioides* Gl.

Flowers racemose

Racemes essentially sessile; leaves spatulate to obovate, hirsute on both sides. *M. vestitum* Sandw.

Racemes distinctly peduncled; leaves lanceolate to subrotund, glabrous to pilosulous above, glabrous beneath; flowers usually distinctly pediceled.

Leaves very unequal in each pair, the smaller soon deciduous, the larger subsessile; flowers sessile or subsessile. *M. gesneriaceum* Sandw.

Leaves essentially equal in most pairs, all distinctly petioled; flowers distinctly pediceled in the raceme.

Leaves blunt to rounded at both ends.

Stem and petioles beset with minute reddish glands; sepals acuminate; flowers 5-merous; spur of the anther blunt, less than half as long as the thecae. *M. glandulosum* Gl.

Stem and petioles glandless; sepals broadly triangular; flowers 4-merous; spur very slender, nearly as long as the thecae. *M. montanum* Gl.

Leaves acute to acuminate, at base cuneate to subcordate; sepals wider than long.

Flowers 4-merous; lateral veins not naked at base.

Leaves rounded or subcordate at base; petals about a fourth as wide as long; hypanthium and sepals together about 4 mm. long at anthesis. *M. fruticosum* Gl.

Leaves narrowly to broadly cuneate at base; petals nearly half as wide as long; hypanthium and sepals 2–2.5 mm. long at anthesis. *M. cristatum* (DC.) Triana.

Flowers 5-merous; lateral primary veins naked at base. *M. fasciculatum* (DC.) Triana.

Diolena longidens Gl. sp. nov.

Suffrutex ramosus; folia valde dimorpha, majora ovato-oblonga supra medium pectinato-dentata, minora elliptica integra; flores 5-meri solitarii, breviter pedunculati; sepala fere semicircularia erosa, dentibus exterioribus subulatis multo breviora; *D. repenti* Gl. habitu valde affinis, differt dentibus exterioribus elongatis et ovario fimbriato.

Stems suffruticose, much branched, 1–3 dm. tall, glabrous, when young strongly flattened and narrowly 2-winged, becoming thickened and sharply 4-angled; internodes 5–10 mm. long. Leaves very dimorphic: the larger ovate-oblong, 12–17 mm. long, 7–9 mm. wide, obtuse, broadly acute at base, entire in the basal half, above the middle pectinate-dentate with strongly ascending teeth, glabrous except a few scattered brown scales on the lower side, 3-nerved, on petioles 1.5–2 mm. long; the smaller leaves essentially sessile, elliptic, 4–5 mm. long, abruptly acuminate, entire, 1-nerved. Peduncles solitary in the upper axils, 6–7 mm. long, subtended at base by a pair of reduced leaves, densely scabrously pubescent with stout curved-ascending hairs. Flowers solitary, 5-merous. Hypanthium cup-shaped, thin-walled, 2.8 mm. long, scabrous like the peduncle. Calyx-tube about 1 mm. long; sepals very thin, almost transparent, 2.6 mm. long from the torus, the free portion depressed-obovate, broadly rounded, conspicuously erose-ciliate; exterior teeth with a triangular base adnate to the base of the calyx, prolonged into a straight, spreading, subulate tip 5 mm. long. Petals and stamens lacking. Ovary superior, 3-celled, tipped with an erect, strongly fimbriate collar.

TYPE: from wet rocks on the escarpment of Cerro Sipapo, *Bassett Maguire & Louis Politi 27505;* New York Botanical Garden. Although stamens are lacking, its close similarity to *D. repens,* even in many details of structure, proves that the two are congeneric, but not that they belong to *Diolena.* Our species differs from *D. repens* in the greatly elongate and consequently very conspicuous exterior teeth of the calyx and in the fimbriate summit of the ovary.

Tateanthus duidae Gl.

Scandent shrub, occasional, north escarpment of Cerro Duida, *Maguire & Maguire 29092;* also recently collected on Cerro Parú by Mrs. Phelps and Hitchcock.

The Parú plants are considerably more tomentose on the lower leaf-surface than those of Duida but differ in no important respect. The relationship of this plant is just as mysterious as when it was first described about twenty years ago. It is the only member of the family, so far as known to me, which combines a totally inferior ovary with a dehiscent capsular fruit. Naturally the dehiscence must affect the hypanthial wall, and it has now been noted that dehiscence is by *ten* longitudinal clefts, two in each of the furrows between the wings of the hypanthium.

Leandra dichotoma (Don) Cogn.

Shrub up to 3 m. tall, mixed wet mountain forest, Savanna Camp to north escarpment, Cerro Sipapo, altitude 1400 m., *Maguire & Politi 27861;* chiefly in the mountains, British Honduras to Bolivia.

Leandra polyadena Ule.

Very viscose shrub, Camp Savanna, Cerro Sipapo, *Maguire & Politi 27565;* endemic to the Pacaraima Mountains.

Miconia holosericea (L.) Triana.

Small tree, riverside above Cuao Creek, altitude 140 m., *Maguire & Politi 27388;* Guianas and Venezuela to Bolivia and southern Brazil.

Miconia aplostachya (Bonpl.) DC.

Shrub to 2 m. tall, Danta Falls, Río Cuao altitude 140 m., *Maguire & Politi 29023;* Amazonian lowlands, British Guiana to Colombia.

Miconia calvescens DC.

Small tree with white flowers, forests in the vicinity of Base Camp, Río Cuao, *Maguire & Politi 28161, 28387;* southern Mexico to Panama and southward to Bolivia and southern Brazil, at low or moderate altitudes.

Miconia dispar Benth.

Mixed lowland rain-forest near Base Camp, Cerro Sipapo, altitude 140 m., *Maguire & Politi, 28401;* an Amazonian species.

Miconia lepidota DC.

Small tree or shrub up to 4 m. tall, Danta Falls, Río Cuao, *Maguire & Politi 28445, 29015;* mostly at low altitudes, from the Caribbean southward to Bolivia and northern Brazil.

Miconia rubiginosa (Bonpl.) DC.

Shrub to 2 m. tall, petals white, San Antonio-Cumana Road pass, State of Monagas, *Maguire, Kunhardt & Politi 27257;* widely distributed in South America as far as southern Brazil, mostly at low altitudes; also in Panama, Costa Rica, Hispaniola, and Puerto Rico.

Miconia rufescens (Aubl.) DC.

Shrub to 2 m. tall, San Antonio-Cumana Road pass, State of Monagas, *Maguire, Kunhardt & Politi, 27255;* French Guiana to Colombia, southward to Bolivia.

Miconia minutiflora (Bonpl.) DC.

Much branched shrub 2.5 m. tall, flowers white, fruit purple, San Antonio-Cumana Road pass, State of Monagas, *Maguire, Kunhardt & Politi 27256;* Colombia to Trinidad, usually at moderate elevations in the mountains.

Miconia myriantha Benth.

Small tree with white flowers, Base Camp, Cerro Sipapo, altitude 140 m., *Maguire & Politi 28169;* abundant in the lowlands of northern South America, especially in the Guianas.

Miconia ciliata (Rich.) DC.

Shrub to 2.5 m. tall, petals pale pink, stamens purple, fruit blue, open scrub vegetation, San Antonio–Cumana Road pass, altitude about 1500 m., State of Monagas, *Maguire, Kunhardt & Politi 27258;* British Honduras to Panama; Jamaica; southward to southern Brazil and Bolivia.

Two other species of Miconia were collected, one from low altitudes on Cerro Marahuaca, *Maguire & Maguire 29180,* the other from Cerro Sipapo, altitude 1350 m., *Maguire & Politi 28517;* both exhibit immature flowers only.

Tococa guianensis Aubl.

Shrub up to 3 m. tall, petals pale pink, frequent in lowland rain-forest near Cerro Duida, *Maguire & Maguire 29152;* British Honduras and Panama; common at low altitudes from the Guianas to Colombia, southward to Peru.

Tococa macrophysca Spruce.

Small shrub, woodland near Base Camp at low altitude, Cerro Sipapo, *Maguire & Politi 28062;* endemic to southern Venezuela.

Tococa oligantha Gl.

Commonly a low shrub up to a meter tall but also noted as a tree 10 m. tall, flowers pink or purple, from various stations on the summit of Cerro Sipapo but usually represented by widely scattered individuals, *Maguire & Politi 27542; 27542a; 27644; 27714;* known also from high altitudes on Cerro Duida and Cerro Parú.

Maieta guianensis Aubl.

Shrub with red fruit, lowland forest south of Culebra, north of Cerro Duida, *Maguire & Maguire 29148,* French Guiana and northern Brazil to southern Colombia, eastern Peru, and Bolivia.

Myrmidone macrosperma Mart.

Shrub to 1.5 m. tall, flowers scarlet, along creek near Base Camp, *Maguire & Politi 27470, 28753;* upper Amazonas and southern Venezuela.

Clidemia affinis (Naud.) Cogn.

Shrub or small tree to 4 m. tall, Base Camp, near Cerro Sipapo, *Maguire & Politi 27451;* Guianas and northern Brazil to Colombia and Peru.

Clidemia aphanantha (Naud.) Sagot.

Base Camp, Cerro Sipapo, *Maguire & Politi 27456;* Trinidad and Venezuela to southern Brazil.

Clidemia capitata Benth.

Large shrub or small tree, frequent in mixed rain-forest at low altitudes, Base Camp, Cerro Sipapo, *Maguire & Politi 28291;* infrequent shrub with white flowers, streamside, east base of Cerro Culebra, altitude about 1350 m., *Maguire & Maguire 29073;* endemic to the mountains of southern Venezuela and British Guiana.

Clidemia coriacea (Naud.) Cogn.

Dry rocks, summit of Cerro Sipapo, altitude 1500–1800 m., *Maguire & Politi 27532, 27667A, 28462;* endemic to the Pacaraima Mountains.

Clidemia capitellata (Bonpl.) Don.

Subshrub to 2 m. tall, flowers greenish white, near Base Camp, Río Cuao, *Maguire & Politi 27364;* southern Mexico to Bolivia.

Clidemia hirta (L.) D. Don.

Shrub to 1.5 m. tall, flowers white, Santa Barbara Camp, State of Monagas, *Maguire, Kunhardt & Politi 27274;* near Base Camp, Río Cuao, *Maguire & Politi 27365;* widely distributed from Vera Cruz to Bolivia and southern Brazil.

Clidemia neglecta D. Don.

Shrub or small tree, infrequent along a water course at Intermediate Camp on Cerro Sipapo, altitude 540 m., *Maguire & Politi 28746;* British Honduras to Panama and through tropical South America to southern Brazil.

Clidemia rubra (Aubl.) Mart.

Subshrub to 1 m. tall, petals white or pale pink, stamens purple, grassy places in sandy soil under Mauripa, Monagas, *Maguire, Kunhardt & Politi 27301;* subshrub to 4 dm. tall, San Antonio-Cumana Road pass, State of Monagas, *Maguire, Kunhardt & Politi 27253;* common, Vera Cruz to southern Brazil and Bolivia.

Henriettella heteroneura Gl., sp. nov.

Frutex cauliflorus; folia anguste elliptica vel oblanceolata, 5-pli-nervia, ad basim angustata in petiolum alatum fere ad caulem; flores 4-meri sessiles; hypanthium tenuissime furfuraceum; sepala late triangularia; petala triangularia acuta.

Shrub, the younger branches glabrous, obscurely 4-angled. Leaves glabrous, narrowly elliptic to oblanceolate, up to 14 cm. long and 5 cm. wide, slenderly acuminate, entire, decurrent at base into a winged petiole about 3.5 cm. long, 5-pli-nerved, the outer pair marginal. Flowers 4-merous, sessile in dense few-flowered clusters below the leaves. Hypanthium cup-shaped, 1.7 mm. long to the torus, thin-walled, obscurely ribbed within, very thinly but completely furfuraceous or sublepidote. Calyx-tube scarcely prolonged; sepals very broadly triangular, about 0.5 mm. long from the torus, merely thickened on the back at the tip. Petals triangular, acute from a broad base, 2.4 mm. long, white. Stamens 8, weakly dimorphic; filaments slender, glabrous, 2.8 mm. long; small anthers stoutly oblong, blunt, 1.7 mm. long, the connective raised down the back into a prominent ridge but truncate at base; large anthers similar, 2.2 mm. long; connective similar but prolonged at base into two short dorsal lobes and two minute lateral lobes. Ovary inferior, much depressed or discoid; style straight, slender, glabrous, 4.4 mm. long to the truncate stigma.

TYPE: from Caño Profundo, summit of Cerro Sipapo, *Bassett Maguire & Louis Politi 28293;* New York Botanical Garden. The specific name has been chosen to avoid the necessity of a transfer if future investigation proves that the plant is conspecific with *Clidemia heteroneura,* a species at present unknown to us.

Henriettella longistyla Ule.

Henriettella micrantha Gl.

Small tree along Río Cunucunuma, below north slopes of Cerro Duida, infrequent, *Maguire & Maguire 29046;* Rio Branco to southern Colombia, at low altitudes.

Loreya minor Cogn.

Large tree with red flowers, Base Camp, Río Cuao, alt. 140 m., *Maguire & Politi 28164;* an Amazonian species.

Loreya mucronata Gl., sp. nov.

Arbor parva, ramis dense strigillosis; petioli elongati; laminae elliptico-ovatae, obtusae, mucronatae, ciliatae, ad basim obtusae vel rotundatae, supra glabrae, subtus ad nervos strigillosae, ad paginam sparsissime strigillosae, 3-plinerviae, jugo marginali neglecto; flores solitarii, subsessiles, 6-meri, infra folia orientes; staminum connectivum carinatum sursum rotundatum.

Small tree, the younger stems 4-angled, very densely strigillose. Petioles 2.5-3 cm. long, strigillose like the stem. Blades thin, elliptic-ovate, up to 2 dm. long by half as wide, obtuse but with a short subulate apiculum from the prolongation of the midnerve, on the margin ciliate or almost spinulose, at base obtuse or rounded, glabrous above or somewhat strigillose on the midnerve only, beneath densely strigillose on the primary nerves, sparsely so on the secondaries, very sparsely on the surface, 3-pli-nerved with an additional pair of submarginal nerves; secondaries straight, 4–7 mm. apart, diverging at an angle of 75–80°; tertiaries obscure. Flowers 6-merous, solitary and almost sessile on the old wood well below the leaves. Hypanthium broadly conic, glabrous, thick-walled, 6 mm. long to the torus. Calyx-tube prolonged 2 mm. to acute sinuses, the limb prolonged about 0.8 mm. farther and very obscurely notched; exterior teeth none. Petals red, about 9 mm. long, very asymmetric, the exposed margin entire, the covered portion greatly widened, very thin and delicate with irregular margin. Stamens 12, isomorphic; filaments stout, somewhat flattened; anthers straight, 4 mm. long; connective prolonged down the back of the thecae about 3 mm. as a thin flat ridge, ending abruptly in a rounded tip. Ovary wholly inferior, apparently 3-celled; ovules few. Style stout, glabrous, 11 mm. long; stigma capitate.

TYPE: from lowland rain-forest, vicinity of Base Camp, foot of Cerro Sipapo, *Bassett Maguire & Louis Politi 28168;* New York Botanical Garden.

COMPOSITAE

Oliganthes areolata Wurdack, sp. nov.

Frutex arborescens ad 8 m.; ramulis cinereo-tomentulosis novellis striatis vetustioribus obscure quadrangulatis; petiolis ad 2 cm. longis, laminis coriaceis 9–15 cm. longis 3.0–4.5 cm. latis elliptico-lanceolatis, ad basim decurrentibus (in sicco irregulariter recurvis), ad apicem acuminatis, ad marginem obscure vel ad apicem evidenter repando-denticulatis, supra glabris nervis subtomentosis exceptis dense reticulato-rugulosis, subtus cinereo- vel brunneo-tomentulosis; capitulis 2–3-floribus pedicello 3–5 mm. longo, involucro 5.0–6.5 mm. longo squamis ad apicem pulverulis, corolla extus modice glandulosa albido-viridi, tubo 2.4–3.9 mm. longo lobis 2.5–2.8 mm. longis, achaenio 9–10-nervo turbinato glanduloso 3.0–3.3 mm. longo 1.4–1.6 mm. lato, paleis pappi 7–10 interioribus 5.0–5.5 mm. longis exterioribus parvis coroniformibus 0.5–1.2 mm. longis.

TYPE: shrub or small tree, along water course, central east drainage, Cerro Sipapo, alt. 1800 m., Jan. 14, 1949, *Bassett Maguire & Louis Politi 28366;* New York Botanical Garden. Paratypes, Cerro Sipapo, *Maguire & Politi:* small tree, Caño Profundo, vicinity of Caño Negro, alt. 1600 m., *28272;* small tree or shrub, flowers greenish-white, terraces, left fork, East Basin, alt. 1800 m., *28339.*

Closely related to *Oliganthes schomburgkii* Schultz-Bip., but distinguished by 2–3- rather than 3–4-flowered capitula, the much larger achenes, larger interior pappus segments, the leaves with a dense reticulum of venules with minute darker areolae (giving a punctate appearance to the upper leaf surface), and the attenuate leaf bases which curl irregularly at least in the dried specimens.

Orthopappus angustifolius (Sw.) Gleason.

Corolla white, Culebra savanna, Río Cunucunuma, *Maguire & Maguire 29062.*

Mikania phelpsii Maguire & Steyermark.

Subsucculent shrub 1 m. high, flowers white, summit West Peak, Cerro Sipapo, alt. 1800 m., *Maguire & Politi 27780.* Known otherwise only from Ptarí-tepuí, near Kavanayén, and Yaví.

Mikania trinitaria DC.

Slope forest, Cerro Sipapo, alt. 900 m., *Maguire & Politi 28795.*

Eupatorium penninervatum Wurdack, sp. nov.

Suffrutex ad 3 m.; ramis pilis flexuoso-patentibus albidis articulatis vestitis pilis brevioribus glandulosis intermixtis; internodiis 1.5–5.0 cm. longis; petiolis 6.0–6.5 cm. longis, pilis ramorum eisdem; laminis 14.5–17.0 cm. longis 6.0–7.5 cm. latis membranaceis utrinque viridibus penninervatis nervis majoribus utrinque 9–13, deltoideo-ovatis, distincte et regulariter acutodentatis dentibus utrinque 20-25 prope basim saepe 3–4 mm. magnis, ad basim subcuneatis ad apicem anguste acutis, pilis ramorum eisdem praeditis; panicula glomerulorum glomerulis 2–3-capitulis; pedicellis gracillimis 1–8 mm. longis, capitulis 23–25-floribus; involucro turbinato 7–8 mm. longo 4 mm. diam., squamis ca. 18 gradatis ca. 3-seriatis in dorso glanduloso-pilosis in facie ventrali pulverulis, extimis ovato-acutis 3–4 mm. longis 1.0–1.8 mm. latis 5-nervis, intimis oblongo-lanceolatis acutis ad 6 mm. longis 3-nervis; receptaculo nudo hemisphaerico ca. 1 mm. diam.; corolla alba angusto-cylindrica 4.0–4.2 mm. longa breviloba lobis 0.15–0.2 mm. longis ad basim pulverula ad apicem sparse puberulo; pappo sub anthesi 3.3–3.7 mm. longo, setis 30–35 barbellatis, achaenio immaturo 1.8–2.0 mm. longo 5-angulato in angulis brevipiloso.

TYPE: subshrub to 3 m. high, flowers white, by waterfalls below escarpment, trail intermediate summit camp, in mixed montane forest, Cerro Sipapo, Terr. Amazonas, Venezuela, alt. about 1000 m., Dec. 3, 1948, *Bassett Maguire & Louis Politi 27506;* New York Botanical Garden.

This anomalous *Eupatorium* has been tentatively assigned to sect. *Conoclinium* (sensu Robinson) because of the naked convex receptacle and involucral bracts which are detached from the capitulum with difficulty; however, within the section, no close relatives are apparent.

Eupatorium roupalifolium Robins.

Shrub to 3 m. high, summit Peak I, Cerro Sipapo, alt. 2000 m., *Maguire & Politi 27630;* shrub, flowers white, wet ledges and cliffs, precipitous east slopes, West Peak, Cerro Sipapo, alt. 1600 m., *Maguire & Politi 27821.* This species is apparently the most widespread *Eupatorium* of those endemic to the Pacaraima system, being known from Roraima on the east to Sipapo and Parú on the west.

Eupatorium xestolepidoides Wurdack, sp. nov. Sect. *Cylindrocephala.*

Suffrutex fuscus ramosus; ramulis teretibus glandulosis dense breviterque (0.25–0.35 mm.) lanatis; petiolis 3–5 mm. longis dense breviterque lanatis, laminis 2.5–3.5 cm. longis 1–2 cm. latis lanceolato-ovatis marginibus recurvatis obscure dentatis, supra modice puberulis, subtus glandulosis dense breviterque lanatisque et prominulenter reticulato-venosis, ad 2 mm. supra basim trinervis, ad basim breviter cuneatis vel rotundatis, ad apicem acuminatis; corymbis laxiusculis 1–3-capitulatis, capitulis 26–30-floribus ca. 9 mm. altis 3–4 mm. diam., involucro e squamis 35–40 rigidiusculis pallidis lucidis ca. 6-seriatis regulariter gradatis 5–3-nervis caducis atomiferis ad apicem nigrescentibus marginibus perbreviter ciliolatis, extimis oblongis perbreviter aristatis, intermediis oblongis obtusis breviter (0.2–0.3 mm.) aristatis, intimis linearibus acutis; corolla 3.9–4.1 mm. longa extus sparse glandulosa, tubo propio gracili 2.2–2.4 mm. longo, faucibus campanulatis 1.2–1.5 mm. altis, dentibus recurvatis 0.4–0.5 mm. longis; pappo 3.5 mm. longo albido, setis ca. 27 barbellatis, achaenio nigro 3.3–3.5 mm. longo 5–4-angulato angulis hispido-scabratis.

TYPE: shrub to 1 m. high, flowers pale lavender, San Antonio–Cumana road pass, State of Monagas, Oct. 24, 1948, Venezuela, *Bassett Maguire, H. R. Kunhardt & Louis Politi 27254;* New York Botanical Garden.

Closely related to *E. xestolepis* Robins., which however has longer cauline pubescence (0.75–1.0 mm.), larger cordate obviously crenate-serrate and generally bullate leaves, fewer involucral scales, and shorter (2.8–3.0 mm.) achenes.

Oyedaea verbesinoides DC.

Small tree to 5 m. high, ray flowers yellow, open scrub on hillside, 15 km. w. of Caripe, State of Monagas, *Maguire, Kunhardt & Politi 27248.*

Calea cardonae Maguire & Wurdack, sp. nov.

Frutex 3 m. altus; ramulis teretibus in sicco pluriangulatulis glabris castaneis; foliis oppositis oblanceolatis, laminis (3) 4–7 cm. longis 1.5–2.5 cm. latis glabris subchartaceis, nervis 2-jugis, lateralibus inferioribus prominentibus superioribus prominulis, venulis reticulatis valde et conspicue lucidis subtus, marginibus creno-dentatis ad basim integris, apice subacuto, basi acuta, petiolo 3–5 mm. longo; inflorescentiis terminalibus umbellatis, 2–6 capitulatis pedunculis 1–4 cm. longis glabris sulcatis; capitulis campanulatis vel hemisphaericis ca. 8 mm. longis 1 cm. latis; receptaculo conico ca. 1.5 mm. alto hirsutulo, paleis 10–12 naviculoideis 7 mm. longis acutis ca. 0.7 mm. latis, bracteis involucri exterioribus 4 foliaceis oblongis ca. 10 mm. longis ca. 3–5 mm. latis, phyllaribus 2–3-seriatis ca. 10, exterioribus ca. 7 mm. longis ca. 3 mm. latis oblongo-lanceolatis obtusis concavis enervis scario-marginatis ciliatis, interioribus oblanceolatis 6–7 mm. longis ca. 1.5 mm. latis; floribus ligulatis ca. 5–6, ligulis oblongo-ellipticis ca. 5 mm. longis 2–3 mm. latis, floribus discoideis 20–25 ca. 4 mm. longis, tubo 1.5 mm. longo, lobis ca. 1 mm. longis acutis; ramulis stylorum ca. 0.7 mm. longis, stigmatibus subcapitatis; pappo squamiformi paleis 2-seriatis ca. 15, ca. 3 mm. longis 0.3–0.5 mm. latis scariosis acutis; achaeniis ca. 3 mm. longis acute 4-angulatis.

TYPE: arbusto 3 m. alto, flores amarillas Acopán-tepuí, 2100 m. alt., Guayana, Venezuela, Octubre 1947, *F. Cardona 2274;* U. S. National Herbarium.

Calea cardonae is well set off from its tepuian relatives by the arrangement of the small heads, proportionately long subtending foliar involucral bracts, and short ray ligules. Vegetatively it is most similar to *C. lucidivenia,* but the leaves of the latter are much smaller.

Calea kunhardtii Maguire, sp. nov.

Frutex pauciramosus 1–2 m. altus; ramulis tenuibus in sicco sulcatis dense pannoso-tomentosis, internodiis 2–4 cm. longis; foliis oppositis coriaceis lanceolatis vel ovatis vel ellipticis (2.5) 3.0–4.0 cm. longis 1.5–2.0 cm. latis, apice obtuso vel acuto, basi rotundata vel acuta, margine integro vel crenulo-serrato, supra glabris triplinervis prominenter reticulato-venosis, subtus dense fulvo-pannoso-tomentosis, petiolis 2–4 mm. longis; capitulo solitario terminali, pedunculo 1–2 cm. longo; involucro campanulato ca. 15 mm. lato 12–15 mm. alto, phyllaribus 4–5-seriatis, exterioribus foliaceis dense tomentosis late oblanceolatis 8–10 mm. longis 4–5 mm. latis, interioribus gradatis oblongis vel oblongo-lanceolatis obtusis vel subacutis 10–14 mm. longis 3–5 mm. latis vittatis late scarioso-marginatis ciliolatis; floribus ligulatis 12–15, ligulis flavis lineari-oblongis vel oblanceolatis 18–22 mm. longis 3–5 mm. latis 5-nervis integris vel 2–3-dentatis supra glabris subtus resinoso-punctatis; pappo squamiformi, squamis 7–10 acuminatis laceratis 1.0–1.5 mm. longis, achaeniis lineari-cuneatis 5-costatis et 5-angularibus glabris ca. 4 mm. longis; corollis discoideis tubulatis ca. 6 mm. longis glabris, lobis ca. 0.5 mm. longis acutis, squamis 0.5–2.5 mm. longis; achaeniis ca. 3 mm. longis 4-angulatis; receptaculo convexo valde alveolato paleaceo, paleis 6–7 mm. longis induratis oblanceolatis acutis minute erosis aliquantum conduplicatis, achaenium subtendentibus.

TYPE: low shrub to 1 m. tall, rays yellow, frequent open scrub savanna, Lower Caño Negro, 1400 m. alt., December 25, 1948, *Bassett Maguire & Louis Politi 27900;* New York Botanical Garden. Paratypes, Cerro Sipapo, *Maguire & Politi:* shrub to 2 m. tall, flowers yellow, open savanna, Caño Negro, 1500 m. alt., December 15, 1948, *27688A;* shrub 1.5 m. high, occasional open scrub savanna, Campo Grande, 1500 m. alt., December 15, 1948, *27672A;* shrub to 2 m. high, rays yellow, savannas and terraces southeast slopes North Mt., Peak I, 1800 m. alt., *27652;* shrub 5 dm. high, rays yellow, occasional terraces along east rim, 2000 m. alt., January 26, 1949, *28634.*

Calea kunhardtii is a handsome shrub generally distributed over the Sipapo cumbre.

Calea membranacea Maguire & Wurdack, sp. nov.

Frutex; ramulis castaneis glabris sulcatis in sicco; ramis maturioribus subangularibus; foliis oppositis, laminis lanceolatis vel oblanceolatis 6–9 cm. longis 3–4 cm. latis submembranaceis glabris vel minute puberulis minute albo-punctatisque venis lateralibus 6–7 jugis subtus prominulis, marginibus serratis, apice brevi-acuminato, basi acuta, petiolo tenui 4–6 mm. longo; capitulis magnis ca. 2 cm. latis, hemisphaericis solitariis terminalibus vel axillaribus, pedunculis foliaribus 6–8 cm. longis; bracteis involucri exterioribus 4–6 foliaceis 15–17 mm. longis ca. 10 mm. latis ovatis obtusis glabris non-glandulosis, phyllaribus 3-4-seriatis, exterioribus oblongis ca. 12 mm. longis 4–5 mm. latis valde 10-nervis, mediis parvioribus, interioribus ca. 8 cm. longis oblanceolatis acutis scariosis 1-nervis; floribus ligulatis 8–10, ligulis ca. 15 mm. longis 5–6 mm. latis obtusis 8-10-nervis, floribus discoideis numerosis ca. 6 mm. longis glabris, tubo ca. 2 mm. longo, lobis ca. 1 mm. longis subacutis; staminibus ca. 2 mm. exsertis, filamentis 1.5 mm. longis, antheris ca. 3 mm. longis acute bicaudatis, appendicibus ca. 0.5 mm. longis triangularibus; pappo squamiformi, squamis 1–2-seriatis 5.5–6.5 mm. longis 0.3–0.4 mm. latis scariosis aristato-attenuatis; stylis ca. 6 mm. longis, stigmatibus subcapitatis; achaeniis 3 mm. longis punctato-maculatis acute 4-angulatis sparse hispidulis.

TYPE: hierbo 1 m. alta, flores amarillas, sabanas de Urimán, 400 m. alt., en las Orillas del Río Caroní, Guayana, Venezuela, September 18, 1946, *F. Cardona 1612;* U. S. National Herbarium; isotype, New York Botanical Garden.

Calea membranacea is most closely to be associated with *C. lucidivenia* Gl. & Blake, but is strongly set off, differing most conspicuously from the latter species in its much larger thinner leaves, and much larger more numerously flowered heads.

Calea nana Maguire, sp. nov.

Fruticulus, caudicibus brevibus erectisque vel repentibus; ramis 10–40 cm. altis tenuibus simplicibus vel pauciramosis ca. 2 mm. crassis dense hispidulis, internodiis 5–10 (30) mm. longis; foliis oppositis subsessilibus 10–15 mm. longis 3–8 mm. latis ovato-acuminatis pauciserratis glabris minute albo-punctatis non glandulosis, triplinervis et reticulatis, basi obtusa vel cuneata; pedunculis 2–10 mm. longis dense hispidulis capitulis solitariis terminalibus vel raro axillaribus; involucro subgradato, bracteis exterioribus 4–5 foliaceis, 6–8 mm. longis, phyllaribus 2–3-seriatis striatis ciliolatis, exterioribus ca. 5 mm. longis, interioribus 6–7 mm. longis aliquantum angustioribus; floribus ligulatis 5–8, ligulis oblongis flavis 6–10 mm. longis 5-nervis inaequalibus minute 5-crenato-dentatis, unguiculis 2–3 mm. longis, pappo ca. 2 mm. longo, achaeniis compressis 1.5–2.0 mm. longis; floribus discoideis 20–30 crateriformibus 3–4 mm. longis, tubo et limbo subaequalibus, lobis oblongo-lanceolatis ca. 1 mm. longis acutis, pappo paleaceo, paleis 1–2-seriatis ca. 2.5 mm. longis acutis ciliolatis, antheris ca. 3

mm. longis apice triangulari 0.5 mm. longo; achaeniis cuneatis ca. 3 mm. longis 4-angulatis, glabris vel minute scabridulis.

TYPE: subshrub 2–3 dm. high, rays yellow, frequent along stream bank, north branch, Caño Profundo, Cerro Sipapo, Terr. Amazonas, Venezuela, 1600 m. alt., January 8, 1949, *Bassett Maguire & Louis Politi 28221;* New York Botanical Garden. Paratypes: Cerro Sipapo, *Maguire & Politi:* low shrub to 3 dm. high, rays yellow, open banks, frequent, Lower Caño Negro, alt. 1400 m., *27915, 28109;* small shrub 2–3 dm. high, infrequent, savannas and terraces, southeast slope North Mountain, Peak IV, 1900 m. alt., *28130;* slender suffrutescent shrub 1–3 dm. high, flowers yellow, moist cliffs, West Peak, 1800 m. alt., *27793.*

Calea nana is generally distributed in the Sipapo Cumbre, being one of the characteristic species of the more moist open areas. It is most closely related to *C. abelioides* Blake of Cerro Duida, which is a larger shrub with smaller umbellate 10-flowered heads, essentially glabrous stems, and conspicuously glandular-punctate "5-ply" larger leaves (having 5 strong nerves arising near the base of the blade).

Calea politii Maguire, sp. nov.

Frutex; ramulis teretibus sulcatis ca. 1.5 mm. diam., hirsutulis cum pilis septatis attenuatis patentibus, item tenuiter granulari-arachnoideis, internodiis 4–8 cm. longis; foliis oppositis, laminis ovatis 2.0–2.5 cm. longis 1.2–1.5 cm. latis, supra glabris, subtus tenuiter granulari-subarachnoideis pilis septatis minutissime albo-punctatis, nervis primariis lateralibus 5-jugis prominentibus secondariis venisque prominente anastomosis reticulatisque, margine serrato ad basim integro, apice subacuto, basi obtusa, petiolo 2–3 mm. longo; capitulo hemisphaerico ca. 15 mm. lato, pedunculo ca. 2 cm. longo; bracteis involucri non-gradatis, exterioribus 2 jugis foliaceis 7–9 mm. longis 3.0–3.5 mm. latis oblongo-ellipticis vel oblongo-oblanceolatis obtusis 5-nervis puberulis, phyllaribus 3-seriatis membranaceis valde 7–9-nervis 7–8 mm. longis oblongo-oblanceolatis obtusis vel subacutis ciliatis; floribus ligulatis 8, ligulis oblongis truncatis ca. 2 cm. longis 4–6 mm. latis 7-nervis inaequaliter denticulatis; floribus discoideis numerosis ca. 5.5 mm. longis, tubo ca. 1.5 mm. longo, lobis ca. 1 mm. longis triangularibus acutis; squamis 10–12 lineari-lanceolatis inaequalibus (1) 2.0–3.5 mm. longis eroso-scariosis; achaeniis immaturis 2.5–3.0 mm. longis glabris.

TYPE: slender shrub with yellow flowers, terraces, East Basin, 1900 m. alt., Cerro Sipapo, Amazonas, Venezuela, January 21, 1949, *Bassett Maguire, Jr. & Louis Politi 28505,* unicate; New York Botanical Garden.

Unfortunately only the single specimen was collected by Mr. Politi and Bassett Maguire, Jr., associates on the Sipapo Expedition. Undoubtedly a most characteristic and attractive shrub is represented by this specimen. The species is not immediately related to *Calea kunhardtii,* its closest congener on Cerro Sipapo.

Calea sipapoana Maguire, sp. nov.

Frutex vel arbor parva; ramulis tenuibus angulatis dense scabro-hirsutulis; foliis oppositis elliptico-lanceolatis vel ovatis 5–9 cm. longis 2.5–6.0 cm. latis valde scabris subtus glandulo-punctatis, subpinnatinervis, nervis lateralibus prominentibus duobus marginalibus nervis collectivis, serratis ad basim integris, petiolis 5–8 mm. longis; inflorescentiis umbellatis, 5–8-capitulatis, terminalibus vel subterminalibus, bracteis foliaceis, pedunculis 10–15 (20) mm. longis, subfiliformibus; capitulis eligulatis campanulatis ca. 1 cm. longis ca. 15 floribus; bracteis exterioribus 2-foliaceis reflexis ovatis 3–6 mm. longis 2–4 mm. latis scabridis glandulosis; phyllaribus 2–3-seriatis submembranaceis obtusis valde vittatis ciliolatis, exterioribus ovatis 3–4 mm. longis ca. 3 mm.

latis valde costatis, interioribus oblongis 5–6 mm. longis 2.0–2.5 mm. latis; corollis crateriformibus 6–7 mm. longis glabris, tubo ca. 2 mm. longo, limbo 2.0–2.5 mm. longo, lobis lanceolatis acutis ca. 1.5 mm. longis rufo-marginatis; antheris exsertis; achaeniis ca. 3 mm. longis valde hirsutis 4-costatis, aliquantum compressis, costis lateralibus prominentioribus, squamis 20–25, 1–2-seriatis lineari-attenuatis ca. 5 mm. longis; paleis submembranaceis conduplicatis 4–5 mm. longis.

TYPE: branched shrub 3–4 m. tall with yellow heads, infrequent, terraces at 1900 m. alt., North Mountain, Peak I, Cerro Sipapo, Terr. Amazonas, Venezuela, *Bassett Maguire & Louis Politi 28602;* New York Botanical Garden. Paratypes: Cerro Sipapo, *Maguire & Politi:* shrub or small tree to 5 m. high, flowers yellow, on granite, occasional along open water course above Intermediate Camp, 500 m. alt., *28717;* shrub to 2 m. high, opening along stream above Intermediate Camp, alt. 500 m., *27480.*

Calea sipapoana and *C. oliverii* Robins. & Greenm. of the region of Mt. Roraima stand very close together. In the latter the leaves are ternate, smaller, less conspicuously serrate, and the petioles shorter. The heads are broader, the flowers and achenes about two-thirds as large, and the achenes less prominently costate and hirsute.

Calea suffruticosa Maguire & Wurdack, sp. nov.

Suffruticosa 3–4 (5) dm. alta; caulibus teretibus paucifurcatis 1–2 mm. diam., ramulis minute cinereo-appresso-hispidulissimis, nodis 1–2 cm. longis; foliis ellipticis vel oblanceolatis, laminis 1.5–2.0 cm. longis, 4–8 mm. latis, sursum paucicrenulatis, ad basim integris, glabris costa excepta conspicue glanduloso-punctatis uninervis, apice obtuso, basi acuta, petiolo 3–4 mm. longo puberulo; capitulis campanulatis terminalibus solitariis, pedunculis subfiliformibus ca. 3 cm. longis; bracteis involucri gradatis jugis exterioribus subfoliaceis oblongis ca. 3 mm. longis extus puberulis, phyllaribus 4–6-seriatis, exterioribus ovatis ca. 3 mm. longis ca. 2.5 mm. latis, mediis elliptico-oblongis ca. 6 mm. longis 3 mm. latis glabrescentibus scario-marginatis, interioribus 7–8 mm. longis ca. 2 mm. latis oblongo-lanceolatis subacutis 3–5-nervis; floribus ligulatis 4–5, ligulis 8–10 mm. longis 1.5–2.0 mm. latis; floribus discoideis 10–15, 5 mm. longis, limbo ca. 3 mm. longo, in tubo abrupte constricto 2 mm. longo, lobis anguste lanceolatis 1.6–1.7 mm. longis; pappo squamiformi, squamis uniseriatis ca. 2.5 mm. longis eroso-scariosis oblanceolatis uninervis aristatis; achaeniis ca. 3 mm. longis obtuse 4-angulatis prominenter hirsutulosis sparse punctato-glandulosis.

TYPE: frutice hasta 50 cm. alto, playa del Río Caroní al pie del raudal Kurukuyá, 740 m. alt., Guayana, Venezuela, Octubre 9, 1946, *F. Cardona 1779;* U. S. National Herbarium.

Calea suffruticosa, belonging to *Eucalea,* seems to have no near relatives in Guayana. Indeed, its relationships seem altogether obscure.

Calea tricephala Maguire, sp. nov.

Frutex 3 m. altus; ramulis in sicco sulcatis sparse hirsutis patentibus; foliis oppositis ellipticis vel lanceolatis vel oblanceolatis (4) 5–7 cm. longis (2) 3–4 cm. latis, firmiter papyraceis vel chartaceis, supra glabris subtus resinoso-punctatis sparse hirsutis vel glabris, apice acuto, basi acuta, margine serrato sursum basim integro, venis primariis ferme 2 jugis recurvis ad apicem, venis secondariis anastomosis cum primariis subtus prominentibus supra prominulis, petiolo 10–15 mm. longo sparse ciliato; cymis terminalibus tricephalis vel monocephalis; pedunculis ebracteatis 2–5 cm. longis sparse hirsutis valde sulcatis; involucris late campanulatis 1.5–2.0 cm. longis 2.0–2.5 cm. latis, bracteis exterioribus 4 foliaceis late ovatis acutis vel obtusculis 8–18 mm. longis 5–11 mm. latis sparse hirsutulis vel subglabris, phyllaribus 3–4-seriatis subindurato-membranaceis conspicue vittatis late scariosis, inferioribus suborbicularibus 7–9 mm. longis superioribus oblongo-oblanceolatis 16–18 mm. longis 6–8 mm. latis; floribus ligulatis ca. 12–14, ligulis flavis oblongo-oblanceolatis 7–9-nervis 12–14 mm. longis 3–5 mm. latis 3-crenato-denticulatis; pappo squamiformi, squamis ca. 15, biseriatis lineari-acuminatis laceratis ca. 3 mm. longis; achaeniis lineari-cuneatis 4–5-angulatis 4–5-costatis, costis sparse hirsutis; floribus discoideis tubulatis numerosis, corollis 6–7 mm. longis glabris, tubo 1.5–2.0 mm. longo, lobis 1.25–1.50 mm. longis acutis, squamis 12–15, biseriatis lineari-acuminatis laceratis 5–6 mm. longis; achaeniis ca. 2.5 mm. longis aliquantum compressis, 5-angulato-costatis, costis sparse hirsutis; receptaculo alveolato convexo vel hemisphaerico paleaceo, paleis 5–6 mm. longis acutis minute erosis, achaenium subtendentibus.

TYPE: shrub 0.5–3.0 m. high, flowers yellow, rays 12–13, infrequent, cumbre along West Rim, south from Camp Caño, Cerro Parú, 2000 m. alt., Terr. Amazonas, Venezuela, February 7, 1951, *Richard S. Cowan & John J. Wurdack 31296;* New York Botanical Garden. Paratype: shrub 2 m. high, rays yellow, leaves with scented glands, cumbre, West Rim, Cerro Parú, 2000 m. alt., Feb. 4, 1951, *Cowan & Wurdack 31246.*

Calea tricephala is most closely related to *C. lucidivenia* Gl. & Blake of Auyán-tepuí, Uaipán-tepuí, and Cerro Guaiquinima, all in the State of Bolívar. For this latter species Gleason and Blake suggest a close affinity with *C. trianae* var. *tolimensis* Hieron. of Colombia. The Venezuelan species, at least, show further strong relationship with *C. myrtifolia* (DC.) Bak. of Minas Geraes, Brazil.

Stenopadus Blake.

Stenopadus carbonae Maguire & Lasser, sp. nov. *Eustenopadus* Blake.

Arbor parva; ramis teretibus crassis glabris; foliis chartaceo-subcoriaceis oblanceolatis glabris, laminis (10) 15–17 cm. longis 3.5–6.5 cm. latis, costa prominenti supra subtusque nervis lateralibus prominentibus, in nervo collectivo 4–8 mm. ab margine remoto, venulis prominenter reticulatis, apice rotundato vel obtuso aliquando brevissimo acuminato, basi anguste acuminata; petiolis 15–25 mm. longis, foliis sursum brevioribus; inflorescentia terminali 1–4-capitata, involucro 3–4 cm. longo valde pyriformi, basi conico-stipitata, bracteis valde gradatis, crasse appresso-rufo-vermiformi-hirsutis, inferioribus 5 mm. longis ovatis induratis obtuse crasso-apiculatis, superioribus lanceolatis ca. 2 cm. longis 6 mm. latis acutis ciliatis, supremis transitis in paleas anguste lanceolatis 3 cm. longis tenuiter subinduratis; floribus 20–25, tubo hypocrateriformi ca. 20 mm. longo glabro quinquelobato, lobis subaequalibus anguste linearibus ca. 15 mm. longis acutis, basi ca. 1 mm. lata; filamentis ca. 5–6 mm. longis, antheris connatis 10–12 mm. longis, appendicum apicibus ca. 2.5 mm. longis, appendicibus caudatis antherarum adjacentium connatis acutis 4.0–4.5 mm. longis; receptaculo plano glabro paleifero, paleis 3–4 deciduis ca. 3 cm. longis 0.5 mm. latis uno saepe persistenti sparse strigosis prope apicem brevissimo-hirsutulis; pappo 18–20 mm. longo sordido, setis 3–5-seriatis prope apicem minute hirsutulis maturis valde reflexis; achaeniis prismaticis 8–10 mm. longis 1.5–2.0 mm. latis acutis 5-angulatis glabris nigrescentibus.

TYPE: en arenizcas y lugares abiertos, Cerro Arepuchi, 600–700 m. alt., Río Caroní, Bolivar, Venezuela, Abril 1945, *Felix Cardona 1181;* New York Botanical Garden; isotype, National Herbarium, Venezuela, Caracas. Paratype: arbol 15 m. alto, alrededor del campamento Peraí-tepuí, 900 m. alt., Río Caroní, Marzo 17, 1947, *F. Cardona 2095.*

Stenopadus cardonae is most closely to be associated with *S. talaumifolius* Blake of Cerro Duida, which has obovate leaves chiefly about 8 cm. long and 4–5 cm. broad, densely strigose branchlets, and much narrower and smaller heads. *S. cardonae* is sharply distinctive because of the ± 20 cm. long peduncle-like terminal axis which tends to become naked by the early loss of the upper reduced leaves.

Stenopadus kunhardtii Maguire, sp. nov. *Eustenopadus* Blake.

Arbor parva vel mediocris; ramis crassis glabris densis axillaribus cristis fuscorum pilorum exceptis; laminis coriaceis subobovatis vel late lanceolatis (10) 12–25 cm. longis 6–8 cm. latis; costa prominenti, nervis lateralibus 8–10 jugis prominulis in nervo collectivo 1–2 mm. ab margine remoto, margine aliquantum revoluto, apice rotundato, basi anguste cuneata vel acuminata; capitulo solitario sessili majusculo stipitato 60–70-flori homogamo; involucro crateriformi 6–7 cm. longo 4–6 cm. lato, stipite 1–2 cm. longo, phyllaribus (10) 12–16 valde gradatis crassulis anguste scario-marginatis minute ciliolatis, inferioribus 6–10 mm. longis ovatis aliquantum acutis, intermediis ovatis vel ovato-oblongis aliquantum obtusis 15–30 mm. longis, superioribus oblongis ca. 40 mm. longis vel minoribus crassulis aliquantum induratis latius scario-marginatis; receptaculo aliquantum concavo vel plano ca. 2 cm. diametro glabro paleilifero, paleis numerosis deciduis 35–40 mm. longis ca. 1.0–1.5 mm. latis, apice latiori minute ciliolato univervis; corollis ca. 40 mm. longis, tubo ca. 24–27 mm. longo, limbo 5–6 mm. longo expanso quinquelobato, lobis 12–15 mm. longis linearibus acutis trinervis, basi 2 mm. lata; filamentis ca. 15 mm. longis, antheris connatis ca. 15 mm. longis, appendicum apicibus ca. 3 mm. longis acutis, appendicibus caudatis antherarum adjacentium connatis ca. 2.5 mm. longis; pappo ca. 3 cm. longo, sordido 4–5-seriato, setis minute barbellatis omnino patentibus; achaeniis 8–10 mm. longis 2.0–2.5 mm. latis 5-angulatis 10-costatis prismaticis glabris castaneis.

1. Stenopadus kunhardtii var. kunhardtii.

Foliis 10–15 cm. longis; capitulo 5–6 cm. longo, stipite capituli ca. 1 cm. longo cum phyllaribus 3–4-seriatis.

TYPE: spreading tree 12 m. high, with branched trunk 25 cm. diam., occasional in thickets of terrace base, Campo Grande, Cerro Sipapo, 1500 m. alt., January 12, 1949, *Bassett Maguire & Louis Politi 28304;* New York Botanical Garden. Paratypes: tree 30 cm. diam., corollas lavender, anthers greenish, occasional, Campo Grande, *Maguire & Politi 28010;* small tree, frequent, Campo Grande, *Maguire & Politi 27896.*

2. Stenopadus kunhardtii var. grandifolia Maguire, var. nov.

Foliis 15–30 cm. longis; capitulo ca. 7 cm. longo, stipite ca. 2 cm. longo, cum phyllaribus 8–10-seriatis.

TYPE: tree 8 m. high, on granite, occasional in thickets bordering watercourse above Intermediate Camp, 500 m. alt., Cerro Sipapo, February 2, 1949, *Bassett Maguire & Louis Politi 28704;* New York Botanical Garden. Paratype: small tree 5 m. high, infrequent in opening along creek above Intermediate Camp, 500 m. alt., Nov. 27, 1948, Cerro Sipapo, *Maguire & Politi 27475.*

The var. *grandifolia* might possibly represent a distinct species. At the present time it seems preferable to interpret it as merely a low-altitude variant.

Stenopadus huachamacari Maguire, sp. nov. *Eustenopadus* Blake.

Arbor parva; ramis glabris crassis cristis parvis axillaribus fuscorum pilorum exceptis, internodiis 2–10 mm. longis, foliis alternis approximatis,

laminis oblanceolatis (7) 8–12 (15) cm. longis, 3.5–6.0 cm. latis, glabris subcoriaceis, costa prominenti, nervis lateralibus primariis prominulis 6–8 jugis anastamosis in nervo collectivo 1–2 mm. ab margine remoto, margine aliquantum revoluto; capitulo solitario sessili majusculo non-stipitato, 60–100-flori homogamo, involucro campanulato 5.5–6.5 cm. longo ca. 6 cm. lato, phyllaribus valde gradatis 6–8(10)-seriatis aliquantum induratis glabris anguste scarioso-marginatis, exterioribus deltoideo-ovatis obtusis 5–10 mm. longis 5–10 mm. latis, intermediis ovatis vel lanceolatis 10–25 mm. longis 10–15 mm. latis obtusiusculis, interioribus oblongo-lanceolatis 30–35 mm. longis, 3–6 (10) mm. latis obtusiusculis prominentioribus marginatis; receptaculo aliquantum concavo vel plano 2.5–2.8 mm. diametro glabro paleilifero, paleis 20–45 deciduis 40–44 mm. longis 0.75–1.5 (2.0) mm. latis linearibus acutis sursum lateraliter scabridulis uninervis; corollis 28–32 mm. longis glabris, tubo ca. 10 cm. longo impercepte expanso in limbum cylindricum 6–10 mm. longum quinquelobatum, lobis linearibus 12–15 mm. longis 0.8–1.0 mm. latis acutis binervis; filamentis 20–25 mm. longis; antheris connatis ca. 10 mm. longis linearibus, appendicum apicibus ca. 2 mm. longis acutissimis, appendicibus caudatis 4.0–4.5 mm. longis acutissimis adjacentibus omnino connatis; grana pollinis magnitudine omnia similia oblato-sphaeroidea 45–55 μ diam., tricolpata, extino laeve rosaceo-pallido, sulco anguste elliptico-depresso, poro disciformi; pappo 12–14 mm. longo sordido 6–7-seriato, setis minute adscendenti-barbellatis, achaeniis immaturis glabris, maturis non visis.

TYPE: slender tree 10 m. high, 8 cm. diam., bracts and anthers red, corolla lobes pale, occasional along banks of Caño de Dios in dense elfin forest, vicinity Summit Camp at 1500 m. alt., Cerro Huachamacari, Terr. Amazonas, Venezuela, December 6, 1950, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30026;* New York Botanical Garden. Paratypes: Summit Cerro Huachamacari, Terr. Amazonas, Venezuela, December 1950, *Maguire, Cowan & Wurdack:* small tree, bracts red, dense woodland, *30012;* small tree, elfin forests, Summit Camp, *30084;* shrub 1–3 m. high, occasional, summit of East Escarpment at 1900 m. alt., *30116;* small tree 4 m. high, involucral bracts dark wine-red, anthers brownish-red, stigmas pink, frequent, ridge at East Escarpment, 1800 m. alt., *30218;* small tree, corolla pinkish-white, stamens bronze-red, flowers 65–100, pales 20–45 per head, ridge, Southwest Escarpment, 1850 m. alt., *30302.*

Stenopadus huachamacari and *S. kunhardtii* both belong to the subgenus *Eustenopadus* Blake, closely related between themselves and with *S. connellii* (N. E. Brown) Blake of the eastern portion of the Guayana Highland, which has densely tomentulose branchlets, broadly elliptic very prominently nerved leaves with obtuse bases, and somewhat smaller flowers some 3 cm. long. The two species here described are superficially very similar, but are distinguished by numerous characters, the most obvious being the non-stipitate heads and narrower smaller leaves of *S. huachamacari,* as contrasted with the stipitate heads and larger broader leaves of *S. kunhardtii.*

Stenopadus crassifolius Blake.

Summit Cerro Huachamacari, Terr. Amazonas, Venezuela, December 1950, *Maguire, Cowan & Wurdack:* branched shrub to 2 m. high, occasional rocky breaks East Ridge No. I, 1820 m. alt., *30049;* moderately branched shrub to 1.5 m. high, flowers white, frequent marshy scrub savanna, East Ridge No. I, 1820 m. alt., *30069;* shrub 0.5–2.0 m. high, common on summit of East Escarpment, 1900 m. alt., *30115;* shrub or small tree to 4 m. high, occasional, elfin forest, west of Caño de Dios, 1500 m. alt., *30243;* shrub 1–2 m. high, flowers 20–35 per head,

pales 7–12, frequent, ridge Southwest Escarpment, 1850 m. alt., *30291.* Summit Cerro Parú, Terr. Amazonas, Venezuela, January, 1951, *Cowan & Wurdack;* shrub 1–3 m. high, flowers yellowish, West Rim at 2000 m. alt., *31102;* shrubs 0.2–2.0 m. high, flowers brownish, locally frequent in drier savannas, cumbre beyond West Rim, 2000 m. alt., *31162.*

This attractive shrub had previously been represented from Cerro Duida only by the type and paratype, *Tate 1014* and *415* respectively. Now it has been rather widely collected and studied in the field as shown by the above citations of exsiccatae from Cerro Huachamacari, separated from Duida by the 20-kilometer-wide valley of the Río Cunucunuma, and from Cerro Parú about 75 kilometers to the northward on the Río Parú, tributary of the Río Ventuari. This species shows little variation throughout its extended range. It was assigned by Blake[28] as the type species of the subgenus *Stomatochaeta* Blake of *Stenopadus.* It is to be questioned if this group, with stiffly erect narrow corolla lobes, can correctly be considered as congeneric with members of the subgenus *Eustenopadus,* in which the corolla lobes are much broader and prominently coiled.

Stenopadus in the broad sense is now accredited with twelve species. The following key may serve to differentiate them and to indicate their general relationship and geography.

Key to the Species of *Stenopadus*

1. Corollas with recurved and coiled lobes which are shorter than the tube (subg. *Eustenopadus* Blake).
2. Leaves subcoriaceous, not at all reticulate; heads solitary.
3. Leaves broadly elliptic, strongly pinnate-nerved; known from the region of Mt. Roraima only. 1. *S. connellii* (Baker) Blake.
3. Leaves obovate to oblanceolate, lateral nerves merely prominulous.
4. Heads conspicuously stipitate or contracted at the base; phyllaries in 10 or more series; leaf blades obovate to broadly oblanceolate (10–) 12–25 cm. long, 6–8 cm. wide; presently known only from Cerro Sipapo. 2. *S. kunhardtii* Maguire.
4. Heads sessile, not at all stipitate or contracted at the base; phyllaries in 8 or fewer series; leaf blades oblanceolate (7–)8–12 (–15) cm. long, 3.5–6.0 cm. broad; presently known only from Cerro Huachamacari. 3. *S. huachamacari* Maguire.
2. Leaves coriaceous, strongly reticulate.
3. Branchlets densely pubescent.
4. Heads 1–3 sessile or on very short peduncles, ca. 15-flowered; outer phyllaries ca. 2.5 mm. wide, inner ca. 1.5 mm. wide; leaves obovate 4–10 cm. long; branchlets densely strigillose; known only from Cerro Duida. 4. *S. talaumifolius* Blake.
4. Heads apparently solitary, ca. 30-flowered; outer phyllaries 3.5–9.0 mm. wide, inner 2–3 mm. wide, branchlets densely strigose; leaves obovate 5–12 cm. long; known only from Cerro Duida. 5. *S. eurylepis* Blake.
3. Branchlets glabrous; leaves oblanceolate (10–) 15–17 cm. long; peduncles sparsely strigillose, usually 5–30 mm. long; heads 2–3, 20–25-flowered; small trees of the Upper Río Caroni, State of Bolívar. 6. *S. cardonae* Maguire & Lasser.
1. Corollas with stiff erect lobes which are longer than the tube.
2. Leaves essentially glabrous, 1-nerved (subg. *Stomatochaeta* Blake).
3. Stems thinly tomentose or strigose, leaves 2 cm. or more in length, petiolate.
4. Stems tomentose; leaves oval to cuneate, 2–4 cm. long; corollas 20–25 mm. long.
5. Heads with about 15 flowers.

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[28] Bull. Torrey Club 58: 490. 1931.

6. Heads 10–15-flowered; Mt. Roraima and vicinity.
   7. *S. condensatus* (Baker) Blake.
6. Heads "13-floris," said to differ from the above "por sus pubescentia y el involucro campanulado"; not seen but possibly not distinct from *S. condensatus.* 8. *S. guaiquinimensis* Badillo.
5. Heads with 30–45 flowers; specimens as identified by Blake from the region of Auyán-tepuí and Mt. Roraima; possibly not distinct from *S. condensatus.* 9. *S. variabilis* Blake.
4. Stems densely strigillose; leaves 4–7 cm. long, 1.5–3.5 cm. broad; corollas 25–30 mm. long, the lobes twice the length of the tube; known only from Cerro Duida. 10. *S. crassifolius* Blake.
3. Stems densely tomentose; leaves sessile oblanceolate 12–21 mm. long, 2.5–4.0 mm. broad; corolla 21–23 mm. long, tube 3–5 mm. long; known only from Auyán-tepuí in the state of Bolívar. 11. *S. cymbifolius* Blake.
2. Leaves densely pannose-tomentose pinnately nerved; achene densely pubescent (subg. *Eriostenopadus* Gleason & Blake); known only from Auyán-tepuí. 12. *S. cinereus* Gleason & Blake.

Gongylolepis Rob. Schomburgk.

The first specimens of this remarkable Composite genus belonging to the tribe Mutisieae were collected by Robert Schomburgk on the savannas of the high plateau of the Gran Sabana near the headwaters of the Mazaruni River, some "35" miles from Mount Roraima. Schomburgk set up the new genus *Gongylolepis* to accommodate this tree composite under the specific name *benthamiana.*[29] Bentham and Hooker[30] thirty-five years later associated the Guianan species with the Brazilian *Stifftia parviflora.* That disposition was adhered to in the Natürlichen Pflanzenfamilien by Hoffman.[31] Blake,[32] however, rejected the alignment, reinstated *Gongylolepis,* and proposed two additional species from Cerro Duida in Terr. Amazonas, Venezuela. Finally Cuatrecasas[33] recently transferred his *Neocaldasia colombiana* of the eastern Andes to *Gongylolepis,* where it properly belongs, raising the number of species then known to four.

Now as a result of the New York Botanical Garden's program of exploration in the Guayana Highland of Venezuela, six additional species have been collected and studied in the field. Interesting patterns of distribution and relationship are beginning to emerge as a result of the additional material.

With one exception, *G. colombiana,* all of the ten species of *Gongylolepis* occur on the sandstone areas of the Guayana Highland. So far as presently known, of the remaining nine species, eight are confined, and mostly with very limited distribution, to the sandstone plateau mountains of Terr. Amazonas. One species, the first discovered in the genus, *G. benthamiana,* has a rather wide distribution in the eastern portion of the Gran Sabana at least from Auyán-tepuí to Mt. Roraima and the eastern terminus of the sandstone plateau region.

Present interpretations of relationship are expressed in the following sectional arrangement:

1. Section **Amplifolia** Maguire, sect. nov. Foliis ferme plus 12 cm. longis 4 cm. latis, oblanceolatis vel oblongo-elliptico-oblanceolatis tantum chartaceis; nervis primariis ultra medio libere anastomosis, venis superficiei superioris tantum prominulis moderate reticulatis.

2. Subsect. **Bracteata** Maguire, subsect. nov. Capitulo solitario; involuco 3.5–4.5 cm. alto. Typus, *Gongylolepis bracteata* Maguire.

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[29] Linnaea 20: 760. 1847.

[30] Gen. Pl. 2^1: 491. 1873.

[31] E. & P. Nat. Pfl. 4^5: 337. 1894; Nachtr. 4^5: 329. 1897.

[32] Bull. Torrey Club 58: 495. 1931.

[33] Fieldiana 27: 51. 1950.

2. Subsect. **Paniculata** Maguire, subsect. nov. Capitulis plurimeris; inflorescentiis paniculatis vel umbellato-corymbosis; involucris 2.5–3.5 cm. latis. Typus, *Gongylolepis paniculata* Maguire.

1. Section **Parvifolia** Maguire, sect. nov. Foliis ferme minus 12 cm. longis 4 cm. latis coriaceis, nervis primariis fere ad margines extendentibus valde reticulatis.

Subsect. **Erioclada** Maguire, subsect. nov. Capitulo solitario; foliis cuneatis vel obovatis. Typus, *Gongylolepis erioclada* Blake.

Subsect. **Benthamiana** Maguire, subsect. nov. Capitulis plurimeris; foliis spathulatis. Typus, *Gongylolepis benthamiana* Rob. Schomburgk.

Key to the Species of *Gongylolepis*

1. Leaves ample (10–)12–20(–27) cm. long, (3–)4–9 cm. wide, chartaceous, primary veins extending little beyond the middle, then anastomosing and with the secondary veins reticulate, veins on upper surface merely prominulous, blades sessile or the petiole broadly winged (sect. *Amplifolia*).
  2. Inflorescence monocephalous (subsect. *Bracteata*).
    3. Peduncle with several conspicuous foliar bracts subtending the solitary head. 1. *Gongylolepis bracteata.*
    3. Peduncle ebracteate or with 1–3 inconspicuous or reduced bracts, and these not closely subtending the solitary head. 2. *Gongylolepis pedunculata.*
  2. Inflorescence polycephalous (subsect. *Paniculata*).
    3. Stems and immature leaves wholly glabrous.
      4. Involucre at maturity 42–45 mm. long (ex descr.). 3. *Gongylolepis colombiana.*
      4. Involucre at maturity 30–35 mm. long. 4. *Gongylolepis paniculata.*
    3. Stems and immature leaves densly villous-pilose. 5. *Gongylolepis yapacana.*
1. Leaves smaller 3–12(–15) cm. long, 1–4(–6) cm. broad, decidedly petiolate (in *G. benthamiana* the petioles are winged and less obvious), coriaceous, the primary veins extending nearly to the margins before anastomosing, veins on upper surface prominent, strongly reticulate (sect. *Parvifolia*).
  2. Inflorescence monocephalous (subsect. *Erioclada*).
    3. Stems and leaves strongly appressed-pilose.
      4. Heads ca. 2 cm. long, sessile; involucral bracts coriaceous glabrous within, corolla glabrous; leaves prominently pinna-nerved and reticulate on the upper surface. 6. *Gongylolepis erioclada.*
      4. Heads 2.5–3.0 cm. long with peduncles 8–15 mm. long; involucral bracts chartaceous, puberulent within, corolla puberulent; leaves inconspicuously nerved and reticulate above. 7. *Gongylolepis paruana.*
    3. Stems and leaves glabrous; heads ca. 3.5 cm. long, involucral bracts coriaceous glabrous within; leaves cuneate obovate, 4–9 cm. long 2–6 cm. broad. 8. *Gongylolepis glaberrima.*
  2. Inflorescence polycephalous, leaves spathulate (subsect. *Benthamiana*).
    5. Stems wholly glabrous; leaves sessile or the petiole broadly winged, primary veins ca. 12 pairs conspicuous and recurved upwards, secondary veins prominently reticulate; achenes glabrous; known only from the Gran Sabana. 9. *Gongylolepis benthamiana.*[34]

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[34] Another species, not recorded above, is *Gongylolepis maroana* Badillo, Bol. Soc. Ven. Ci. Nat. 8: 237 (1943), the type of which is *Williams 14394* Maroa, Río Guainía, Venezuela. This element apparently is conspecific with *Stifftia martiana* Baker in Mart. Fl. Bras. 6^3: 351 (1884), collected by Martius in "alto Amazonas, in horrida solitudine montis Araracoara, 500 pedes supra fluvium Japurá." We understand that other authors are elsewhere making the necessary nomenclatural adjustment to accommodate the transfer and synonymy.

The species seems to be most closely related to *G. benthamiana* Rob. Schomb. (see above), and may be distinguished most readily from the Schomburgk species by the distinct (1–2 cm.) petiolation of the leaves, the smaller (2 cm. long) heads, and the purplish-brown rather than pale straw-colored pappus.

5. Stems densely villous-pilose; leaves with obvious but narrowly winged petiole 1.0–1.5 cm. long, primary veins 6–7 pairs, inconspicuous, tegether with secondary veins moderately reticulate; achenes puberulent; known only from Cerro Huachamacari.
10. *Gongylolepis huachamacari.*

1. **Gongylolepis bracteata** Maguire, sp. nov.

Arbor parva glabra ad 10 m. alta; ramis glabris crassis, internodiis 0.5–1.0 cm. longis; foliis alternis congestis (8) 10–18 cm. longis (3) 4–6 cm. latis, oblanceolatis vel elliptico-oblanceolatis chartaceis, nervis lateralibus prominulis mox anastomosis, venulosis reticulatis, apice obtuso vel rotundato, basi angustata, petiolis 8–15 mm. longis alatis; pedunculis 10–15 cm. longis terminalibus vel axillaribus, bracteis 3–5-foliatis sessilibus subamplexicaulibus ovatis (2) 3–6 cm. longis 2.0–3.5 cm. latis obtusis, capitulum propinque subtendentibus; capitulo late campanulato 3.5–4.5 cm. alto, phyllaribus valde gradatis, exterioribus orbiculari-ovato-oblongis 12–15 mm. longis 10–12 mm. latis, interioribus elliptico-oblongis vel oblongis 30–35 mm. longis (5) 8–10 mm. latis; receptaculo plano vel aliquantum convexo glabro epaleaceo; floribus numerosis, corollis bilabiatis glabris, lobo posteriori lineari 14–16 mm. longo 3–4 mm. lato minute 3-dentato, lobis anterioribus anguste linearibus 14–16 mm. longis ca. 1.0–1.2 mm. latis, tubo 15–16 mm. longo; antheris connatis 15–18 mm. longis, appendicum apicibus ca. 3 mm. longis, appendicibus caudatis linearibus obtusis ca. 5 mm. longis adjacentibus 2–3 mm. connatis, filamentis ca. 10 mm. longis in orificio tubi affixis; pappo ca. 2 mm. longo sordido, setis fragilibus minute barbellatis; stylo ca. 3 cm. longo, ramulis ca. 2 mm. longis subtruncatis obscure trilobatis glabris; achaeniis ca. 15 mm. longis anguste 10-costatis glabris vel sparse granulatis, annulo brevissimo.

TYPE: small slender tree to 8 m. high, heads solitary, flowers whitish-purple, leaves pale green, occasional in thickets along base of terrace, Campo Grande, Cerro Sipapo, 1500 m. alt., Terr. Amazonas, Venezuela, December 12, 1948, *Bassett Maguire & Louis Politi 27604;* New York Botanical Garden. Paratypes: Cerro Sipapo, *Maguire & Politi:* tree 10 m. high, frequent, escarpment breaks Campo Grande, 1500 m. alt., *27560;* tree 5 m. tall, frequent, terraces, southwest slopes Peak I, 1800 m. alt., *27657;* small tree, frequent, lower Camp Savanna, Caño Negro drainage, 1500 m. alt., *27903.*

Gongylolepis bracteata seems to be the sole representative of the genus to occur on Cerro Sipapo, but is a conspicuous feature of open scrub savanna thickets and terraces.

2. **Gongylolepis pedunculata** Maguire, sp. nov.

Arbor parva ad 12 m. alta; ramis 8–12 mm. crassis, internodiis 5–8 mm. longis juvenilibus dense longo-albo-pilosis; foliis alternis congestis (10) 15–20 (25) cm. longis 5.5–8.0 cm. latis (foliis ramorum sterilium maximis 40 cm. longis 14 cm. latis) oblanceolatis obtusis sessilibus chartaceis, nervis lateralibus prominulis mox anastomosis ad margines non extendentibus, venulis reticulatis; monocephala; pedunculis glabris terminalibus 5–15 cm. longis 4–5 mm. crassis ebracteatis vel 1–2 bracteis subfoliaceis 4 cm. longis vel bracteolis reductis; capitulis campanulatis 3.5–4.5 cm. longis 4–6 cm. latis, phyllaribus 5–6-seriatis valde gradatis, exterioribus ovatis late obtusis 10–12 mm. longis 10–15 mm. latis, interioribus oblongis 3.0–3.5 cm. longis 5–8 mm. latis, apice rotundato, omnino punctatis subinduratis marginibus scariosis; receptaculo plano-convexo glabro epaleaceo 15–18 mm. diam.; floribus 50–75; corollis purpurellis glabris bilabiatis, lobo posteriori lineari 18–20 mm. longo 4 mm. lato minute 3-dentato, lobis anterioribus anguste linearibus 16–18 mm.

longis 1.0–1.5 mm. latis, tubo ca. 2 cm. longo 3 mm. diam.; antheris connatis ca. 18 mm. longis, appendicum apicibus acutis ca. 2 mm. longis, appendicibus caudatis linearibus ca. 5 mm. longis obtusiusculis 2–3 mm. adjacentibus connatis, filamentis 8–10 mm. longis in orificio tubi affixis; pappo purpureo-sordido, setis fragilibus minute barbellatis; stylo 4–5 cm. longo ramulis 1.5–2.0 mm. longis obscure trilobatis glabris; achaeniis 10–12 mm. longis nigrescentibus obscure prismaticis glabris, annulo brevissimo.

TYPE: spare tree 2–8 m. high, flowers reddish-purple, frequent in moist scrub woodland of cumbre, 2000 m. alt., Cerro Parú, Amazonas, Venezuela, Feb. 2, 1951, *Richard S. Cowan & John J. Wurdack 31131;* New York Botanical Garden. Paratypes: Cerro Parú, *Cowan & Wurdack:* leaves from juvenile trees averaging much larger than those of flowering trees (data as for type *31131*), *31132;* trees 2–10 m. high, stamens, pistils, apex of corollas brownish-purple, scrub forest cumbre 2000 m. alt., *31310.* Cerro Huachamacari, *Maguire, Cowan & Wurdack,* Terr. Amazonas, Venezuela, December 1950: fastigiately branched tree 10 m. high, corollas purple, frequent, 1500 m. alt., *30007;* virgate tree 5–8 m. high, branches whorled in 3's, flowers pale purplish, frequent in elfin forests, Summit Camp, 1500 m. alt., *30083;* vegetative shoots from immature tree, 1500 m. alt., *30184;* wooded areas below East Escarpment, 1820 m. alt., *30256.*

Gongylolepis pedunculata is obviously most closely related to *G. bracteata,* differing primarily by the conspicuous bracts subtending the heads of the latter. They both seem to form an interrelated subgeneric group with *G. colombiana* of the Venezuelan Andes, the only species of the genus known to occur outside of the Guayana Highland.

3. Gongylolepis colombiana (Cuatr.) Cuatrecasas, Fieldiana 27: 51. 1950.

Apparently confined to the Eastern Andes of Colombia and Venezuela. This is the only species of the genus which is known to occur outside the limits of the Guayana Highland. No material of it has been seen by us.

4. Gongylolepis paniculata Maguire & Phelps, sp. nov.

Arbor parva vel frutex, glaber; ramis crassis internodiis 1 cm. vel minus longis; foliis 12–25(–27) cm. longis (2.5–)3.0–8.0 (9.0) cm. latis, anguste oblanceolatis vel elliptico-oblanceolatis chartaceis, nervis primariis 12–15 jugis lateralibus prominulis anastomosis non ad marginem extendentibus, venulis prominenter reticulatis, apicibus late obtusis vel minute retusis vel obtusiusculis aliquantum conduplicatis, petiolis 1.0–1.5 mm. longis late alatis; inflorescentiis corymboso-paniculatis, terminalibus (3) 5–15 capitulatis, axibus 20–60 cm. longis, ramis primariis 15–30 cm. longis 2–3-ramosis, ramis ultimis 2–4 cm. longis, bracteis foliatis ovatis vel oblongo-obovatis sessilibus vel subsessilibus (1.0) 3.0–6.0 (7.0) cm. longis (1) 2–3 cm. latis, bracteolis squamiformibus 2–3 mm. longis obtusis, capitula remote subtendentibus; capitulis (3) 5–15 floribus; involucris anguste campanulatis 3.0–3.5 cm. longis, bracteis concavis coriaceis punctatis valde gradatis marginibus scariosis exterioribus 5–8 mm. longis ovatis vel rotundatis, interioribus anguste elliptico-oblongis 25–30 mm. longis; receptaculo glabro plano vel aliquantum convexo; corollis profunde bilobatis ca. 3.0 mm. longis glabris, tubo ca. 12 mm. longo 5-costato, lobo posteriori ca. 18–20 mm. longo 3–4 mm. lato, minute tridentato; lobo anteriori profunde bifido, segmentis ca. 18 mm. longis ca. 0.75–1.25 mm. latis; filamentis ca. 8 mm. longis, in orificio tubi affixis, antheris 14–16 mm. longis, appendicum apicibus obtusiusculis, appendicibus caudatis truncatis ca. 5 mm. longis, 3–4 mm. adjacentibus connatis; pappo albido-sordido ca. 2.0 cm. longo, setis numerosis pluriseriatis fragilibus minute barbellatis, in corona 0.5 mm. alta connatis;

achaeniis 12–15 mm. longis ca. 1.5 mm. diam. fusiformibus pallescentibus 10-costatis, costis angustis, annulo ca. 0.25 mm. alto.

TYPE: shrub or small tree to 6 m. high, flowers white-purplish, frequent in open upper montane woodland, Caño Verada, 1200 m. alt., Cerro Guanay, Amazonas, Venezuela, January 30, 1951, *Bassett Maguire, Kathleen D. Phelps, C. B. Hitchcock & G. Budowski 31655;* New York Botanical Garden. Paratypes: Amazonas, Venezuela: small tree 3 m. high, flowers white and lavender, Cerro Yaví, alt. 2000 m., March 1–3, 1947, *Phelps & Hitchcock 79;* small tree, occasional along stream above Culebra Falls, North Escarpment, Cerro Duida, 1400 m. alt., April 23, 1949, *Maguire & Maguire 29072;* tree to 6 m. high, frequent in montane savanna along stream, 800 m. alt., Cerro Moriche, Jan. 14, 1951, *Maguire, Cowan & Wurdack 30914;* dominant cumbre tree 2–5 m. high, frequent, summit Cerro Moriche, 1250 m. alt., *Maguire, Cowan & Wurdack 30956;* tree 3 m. high, leaves red-margined, fruit post-mature, summit Cerro Moriche, 1250 m. alt., *Maguire, Cowan & Wurdack 30961;* tree 5 m. high, *30862;* tree to 10 m. high, codominant with *Gleasonia duidana* Standl., Cerro Camani, 1800 m. alt., *Maguire, Phelps, Hitchcock & Budowski 31819.*

So far as known, *Gongylolepis paniculata* is confined to sandstone mountains of Amazonas in southern Venezuela. It is evidently the most widespread species of the genus in the western part of the Guayana Highland. Although of relatively wide distribution, *G. paniculata* forms a fairly homogeneous population. As now recognized, there is one departure—a variant of the cumbre of Cerro Guanay in which the inflorescence is umbellate and the leaves smaller, more nearly elliptic and less prominently veined than in the var. *paniculata.*

Gongylolepis paniculata Maguire & Phelps var. **umbellata** Maguire & Phelps, var. nov.

Inflorescentia umbellata, foliis plus-minus ellipticis, supra venis inconspicue prominulis.

TYPE: shrub or tree to 4 m. high, inflorescence umbellate, flowers white, occasional, thicket about pool, cumbre Cerro Guanay, Terr. Amazonas, Venezuela, 2000 m. alt., February 2, 1951, *Bassett Maguire, Kathleen D. Phelps, C. B. Hitchcock & G. Budowski 31711;* New York Botanical Garden.

5. **Gongylolepis yapacana** Maguire, sp. nov.

Arbor parva 15 m. alta; ramis ca. 1 cm. crassis dense fulvo-pilosis denique glabrescentibus, internodiis 1 cm. vel minus longis, foliis oblanceolatis ferme chartaceis 12–22 cm. longis 4–9 cm. latis, apice obtuso, basi angusta, nerviis primariis 16–20 jugis prominulis ad margines anastomosis, secondariis venulisque prominenter reticulatis, foliis juvenilibus puberulis mox glabrescentibus, costa et petiolo dense subpilosis denique glabriusculis; inflorescentia corymbosa; pedunculo 15–30 cm. longo ad basim pubescenti, bracteis foliaribus elliptico-oblongis vel ovatis obtusis sessilibus vel brevi-petiolatis 2–7 cm. longis 1–3 cm. latis; capitulis immaturis sed evidenter anguste campanulatis excedentibus 2.5 cm. longitudine; cogenera in sectione *Paniculata* similia.

TYPE: trees to 15 m. tall, young leaves and stems pubescent, frequent in cumbre at 1200 m., no trees with mature flowers observed, Cerro Yapacana, Amazonas, Venezuela, January 3, 1951, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30706;* New York Botanical Garden. Paratypes: Cerro Yapacana, *Maguire, Cowan & Wurdack:* tree 7 m. high, near summit, 1000 m. alt., Jan. 2, *30631;* cumbre 1200 m., vegetative shoots only, *30742.*

Gongylolepis yapacana appears to be confined to the isolated sandstone table mountain, Yapacana, where it is one of the prominent elements of the rugged densely vegetated summit. The thick conspicuous pubescence of the shoots and immature leaves is unique in the section *Paniculata.* Otherwise, this closely confined endemic fits well into the section.

6. **Gongylolepis erioclada** Blake, Bull. Torrey Club 58: 495. 1931.

Known only from Cerro Duida, Terr. Amazonas, Venezuela.

7. **Gongylolepis paruana** Maguire, sp. nov.

Frutex vel arbor parva ramosa 2-5 m. alta; ramis 3-4 mm. diam., dense appresso-sericeo-tomentoso-pilosis denique glabrescentibus, internodiis 4-6 mm. longis; foliis alternis coriaceis oblanceolatis vel oblongo-ellipticis (3) 4-6 cm. longis 1-3 cm. latis, apice obtusiusculo vel obtuso, basi acuta vel aliquando obtusa, nervis primariis ca. 6 jugis, supra inconspicue prominulis, subtus nervis venulisque prominenter reticulatis, foliis juvenilibus conspicue appresso-tomentoso-pilosis mox glabrescentibus, petiolis 6-8 mm. longis, dense similiter pubescentibus; capitulo solitario, pedunculis 8-15 mm. longis, dense similiter pubescentibus cum 1-3 bracteis 3-5 mm. longis vel subfoliaribus ad 10 mm. longis; capitulis anguste campanulatis 2.5-3.0 cm. longis 18-22 mm. latis, phyllaribus gradatis 5-6-seriatis purpurellis obtusis vel rotundatis ad margines scariosis, exterioribus glabris late ovatis vel orbicularibus 4-6 mm. longis, interioribus 2.5-3.0 cm. longis anguste vel aliquantum late oblanceolatis cucullatis intus puberulis; receptaculo ca. 5 mm. diam. convexo glabro; floribus 8-15, corollis bilabiatis sparse puberulis, lobo posteriori 15-18 mm. longo minute tridentato ca. 2.0-2.5 mm. lato, lobis anterioribus 0.8-1.0 mm. latis, tubo 11-13 mm. longo; antheris connatis 14-15 mm. longis, appendicum apicibus ca. 1 mm. longis acutis, apice incurvo, appendicibus caudatis 2.5-3.0 mm. longis acutis 1 mm. liberis; filamentis ca. 8 mm. longis in orificio tubi affixis; pappo 12-14 mm. longo, purpurello, setis fragilibus minute barbellatis; stylo 3.0-3.5 cm. longo, ramulis ca. 2 mm. longis subtruncatis glabris obscure trilobatis; achaeniis 5-7 mm. longis glabris linearibus pallidis, annulo inconspicuo.

TYPE: much branched shrub 2 m. high, young leaves pubescent, corollas yellowish with red-brown veins, occasional at sabanita edge, cumbre along West Rim, 2000 m. alt., Cerro Parú, Amazonas, Venezuela, February 4, 1950, *Richard S. Cowan & John J. Wurdack 31239;* New York Botanical Garden. Paratype: trees 3-5 m. high, bracts purple-edged, corolla yellowish with purple-brown veins, stamens and style purple-brown, occasional, rocky sabanita, south-southeast escarpment Cerro Parú, *Cowan & Wurdack 31375.*

Gongylolepis paruana is known only from Cerro Parú. It is most clearly related to the meagerly collected *G. erioclada* Blake of Cerro Duida but differs most obviously in the inconspicuously smaller sessile heads and the more prominently veined upper leaf surfaces of the latter.

8. **Gongylolepis glaberrima** Blake, Bull. Torrey Club 58: 494. 1931.

Known only from Cerro Duida, Terr. Amazonas, Venezuela.

9. **Gongylolepis benthamiana** Rob. Schomburgk, Linnaea 20: 759. 1847.

The type, *Rob. Schomburgk 1583,* was collected from the savannas near the "Caramang" or Carimani River, headwater tributary of the Mazaruni Rivers, within "35 miles" of Mt. Roraima (probably within the Venezuelan boundary). The species is known generally from the Gran Sabana region from Auyán-tepuí to Roraima.

10. **Gongylolepis huachamacari** Maguire, sp. nov.

Arbor parva vel frutex 1-5 m. altus, simplex vel pauciramosus; ramis 8-10 mm. diam., internodiis brevissimis juvenilibus dense fusco-villoso-pilosis; foliis alternis congestis (5) 8-12 (15) cm. longis (1.2) 2-3 cm. latis oblanceolatis coriaceis, apice obtuso aliquantum retuso, basi acuminata, costa prominula, nervis lateralibus ca. 6 jugis inconspicuis, nervis venulisque valde reticulatis, petiolo 1.0–1.5 cm. longo angustissime alato; inflorescentiis umbellato-corymbosis; axibus 15–20 cm. longis glabris, bracteis foliaceis sessilibus oblanceolatis 2.5–4.0 cm. longis; pedunculis subumbellatis vel corymbosis 3–7 cm. longis ebracteatis vel 1–3 bracteis foliaribus reductis; capitulis 4–10 campanulatis 22–27 mm. altis 20–30 mm. latis, phyllaribus 30–40 gradatis, exterioribus ovatis 5–7 mm. longis, mediis orbiculo-obovatis 12–15 mm. longis, interioribus 24–26 mm. longis 5–8 mm. latis oblongo-oblanceolatis purpurellis intus plus-minus dense puberulis; receptaculo ca. 8 mm. diam. convexo puberulo epaleaceo; floribus 18–25, corollis albidis minute puberulis, tubo 8–10 (12) mm. longo, lobo posteriori lineari ca. 3.5 mm. lato, 18–22 mm. longo 3-dentato, lobis anterioribus linearibus ca. 1 mm. latis 18–22 mm. longis; antheris 17–18 mm. longis connatis, appendicum apicibus 1.5–2.0 mm. longis acutiusculis, appendicibus caudatis linearibus obtusiusculis ca. 5 mm. longis 2–3 mm. connatis, filamentis ca. 7–8 mm. longis in orificio tubi affixis; pappo 15–16 mm. longo albido, setis fragilibus barbellatis, stylo ca. 3.5 mm. longo, ramis glabris 1.0–1.2 mm. longis obscure 3-lobatis; achaeniis ca. 8–9 mm. longis sparse puberulis olivaceis aliquantum compressis 10-costatis, annulo brevissimo.

TYPE: tree 5 dm.–3 m. high, mostly unbranched, leaves coriaceous, glossy green above, white-tesselate below, red-tinged toward tips of branches, "peduncle," bracts, involucre, and anthers reddish, corolla and pappus white, locally frequent, mainly scrub savanna, Southeast Escarpment, 1900 m. alt., Cerro Huachamacari, Río Cunucunuma, Río Orinoco, Amazonas, Venezuela, December 11, 1950, *Bassett Maguire, Richard S. Cowan & John J. Wurdack 30135;* New York Botanical Garden. Paratypes: Cerro Huachamacari, *Maguire, Cowan & Wurdack:* data as for the type, *30136* and *30137;* tree to 5 m., occasional, cliffs and broken ledges, East Ridge No. 1, 1820 m. alt., *30080;* tree 2 m. high, East Escarpment, 1900 m. alt., *30262;* tree 1–6 m. high, flowers white, occasional dense high scrub in broken terrain, Southwest Escarpment, 1850 m. alt., *30293.*

So far as known, this fine plant is confined to Cerro Huachamacari, where it is a conspicuous and striking feature of the more open cumbre summits. As the genus is now understood, its closest relative is G. *benthamiana* Rob. Schomb. of the eastern Gran Sabana region.

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The Bahama Flora, by Nathaniel Lord Britton and Charles Frederick Millspaugh. 695 pages. 1920. $6.25.

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Addisonia. Colored plates of flowering plants, accompanied by popular descriptions; eight plates in each number, thirty-two in each volume. Now in its twenty-second volume. 1916- Free to members of the Garden; to others $10.00 a volume.

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The Garden Journal of The New York Botanical Garden. (Replaces the *Journal of The New York Botanical Garden.*) Issued bimonthly; contains non-technical articles on botany and horticulture, illustrated. 1951- Free to members of the Garden; to others $2.00 a volume.

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VEGETATION OF NAYASALAND
REPORT ON THE VERNAY NYASALAND EXPEDITION OF 1946

L. J. BRASS

INTRODUCTION

The Vernay Nyasaland Expedition of the American Museum of Natural History, on which I represented the New York Botanical Garden, was sponsored and led by Mr. Arthur S. Vernay, a trustee of the Museum and a member of the Council of the Garden. Other members of the party were Dr. Harold E. Anthony, Chairman of the Department of Mammals, American Museum, and the late Capt. Guy C. Shortridge, Director of the Kaffrarian Museum, King William's Town, South Africa.

The history of Nyasaland may be said to have begun in 1859, when a party led by David Livingstone, the great explorer-missionary, ascended the Shire River by steam launch from the Zambezi and examined southern parts of the country. Missionaries and traders, following Livingstone, were soon in conflict with Arab slavers and their native allies, and in order to cope with this situation Britain, in 1889, proclaimed a protectorate over the Shire Highlands, in the southern part of the area now included in Nyasaland. Two years later, the name Protectorate of British Central Africa was applied to all territories then under British influence north of the Zambezi, including, in addition to all of Nyasaland, parts of Tanganyika and Northern Rhodesia. In 1893 the title British Central Africa was confined officially to Nyasaland, and in 1907 the title was changed to Nyasaland Protectorate.

Beginning in May and ending in October, our work in Nyasaland was carried out in the dry season of 1946 (Brass 1948). The principal zoological interest of the expedition was in mammals, but some attention was given to the collection of reptiles and amphibians, fishes, and insects. The plant collections of the expedition comprised 2004 numbers, including 235 of non-vascular cryptogams. An average of 6.2 herbarium sets was collected in vascular plants.

The taxonomic work on the flowering plants, ferns, and fern allies was undertaken by the Royal Botanic Gardens, Kew. This work is still in progress. Except for some few species which I could identify with reasonable certainty in the field, and the mosses, determined by Edwin B. Bartram, the plant names cited in this report rest on the authority of lists received from Kew. All but the following groups were determined by J. P. M. Brenan: ferns (F. Ballard); grasses (C. E. Hubbard); sedges (E. Nelmes); orchids (V. S. Summerhayes); Ranunculaceae, Menispermaceae, Nymphaeaceae, Capparidaceae, Violaceae, *Kiggelaria,* Pittosporaceae, Polygalaceae, Caryophyllaceae, Hypericaceae, Guttiferae, Dipterocarpaceae, *Geranium, Crassocephalum,* Acanthaceae, Eriocaulaceae, *Eriosema* (E. Milne Redhead); Anacardiaceae (except *Lannea* and *Sorindeia*), *Allophyllus, Lantana, Lippia, Rhynchosia* (R. D. Meikle); Melianthaceae (B. Verdcourt); *Brachystegia* (A. C. Hoyle); *Alepidea* (H. Weimarck); Gesneriaceae (B. L. Burtt); Amaranthaceae (K. Suessenguth); Proteaceae (R. D. Meikle and J. P. M. Brenan); *Lobelia* (E. Wimmer); *Agathisanthemum, Kohautia, Oldenlandia, Pavetta* (C. E. B. Bremekamp).

New species described, or being described, from the collections of the Vernay Expedition are indicated in the following pages by an asterisk. My serial collection numbers are given for plants which are as yet undetermined.

PHYSICAL FEATURES AND GEOLOGY

From the prominence of its mountains and lakes, Nyasaland has been called the "Scotland of Africa" by an admirer of its scenic beauties. About 520 miles in length and from 10 to 130 miles in width, it has an area of approximately 37,890 square miles. To the northwest is Northern Rhodesia, to the north and northeast Tanganyika Territory, and bordering its southern half Mozambique or Portuguese East Africa.

To quote from Dixey (1932): "The dominant feature in the physiography of the country is the deep, trough-like depression, forming part of the Great Rift Valley, that traverses it from end to end; the greater part of this trough is occupied by Lake Nyasa and the remaining part by the Shire River. The country on either side of the trough is made up of high plateaux. For example, that lying west of the lake stands mainly between 3,300 and 4,400 feet above sea-level. Near Dedza it rises to about 5,000 feet and towards the northern end of the lake the Vipya, Nyika, Mafingi and Misuku uplands rise to altitudes of 6,000 to 7,500 or even 8,000 feet. South of the lake the Shire Highlands plateau is surmounted by the Mlanje Mountains, rising to nearly 10,000 feet, and the Zomba uplands to about 7,000 feet.

"Lake Nyasa stands at an elevation of about 1,520 feet, and the adjacent lake plains rise to about 1,700 feet; the southern part of the rift, occupied by the Lower Shire, stands only at 200 to 300 feet above sea-level.

"Owing to the manner in which it is traversed by the rift valley a large proportion of the Protectorate is more or less of mountainous character; this is particularly the case along the sides of the rift valley, which are generally steep locally and even precipitous. Apart from the floor of the Upper and the Lower Shire Valley, almost the only country of fairly even surface comparable with the greater part of Southern and Northern Rhodesia is the Angoniland plateau, which indeed is merely an extension of the great Rhodesian plateau."

Lake Nyasa, the third largest lake in Africa, is 350 miles long, 20 to 50 miles wide, and near its northern end over 300 fathoms deep. Smaller lakes include Lake Chiuta and shallow, brackish Lake Chilwa on the eastern Portuguese border. Lake Chilwa has no outlet.

With the exception of an area on the eastern Portuguese border which drains in part east to the Lujenda River and in part to Lake Chilwa, the whole of Nyasaland is drained by streams that flow to the Rift and empty into either Lake Nyasa or its outlet the Shire River, and so, by the Shire, south to the Zambezi. The longest river other than the Shire, the South Rukuru, has a length of about 170 miles. Many of the rivers run throughout the year in their upper course, but are intermittent in their lower course through evaporation and absorption in the dry season. Only a few maintain a year-round flow throughout their entire length.

Dixey (l.c.) states that the basement rocks of Nyasaland consist of a complex of schists and gneisses, probably Pre-Cambrian, invaded by various intrusives. Massive intrusions of syenite, well exemplified in Mlanje and Zomba mountains, constitute prominent orographical features. Isolated blocks of sediments and lavas of the Karroo System (Permain to Rhaetic) occur as relicts of denudation, preserved by down-faulting into the older rocks in the Lower Shire Valley, on

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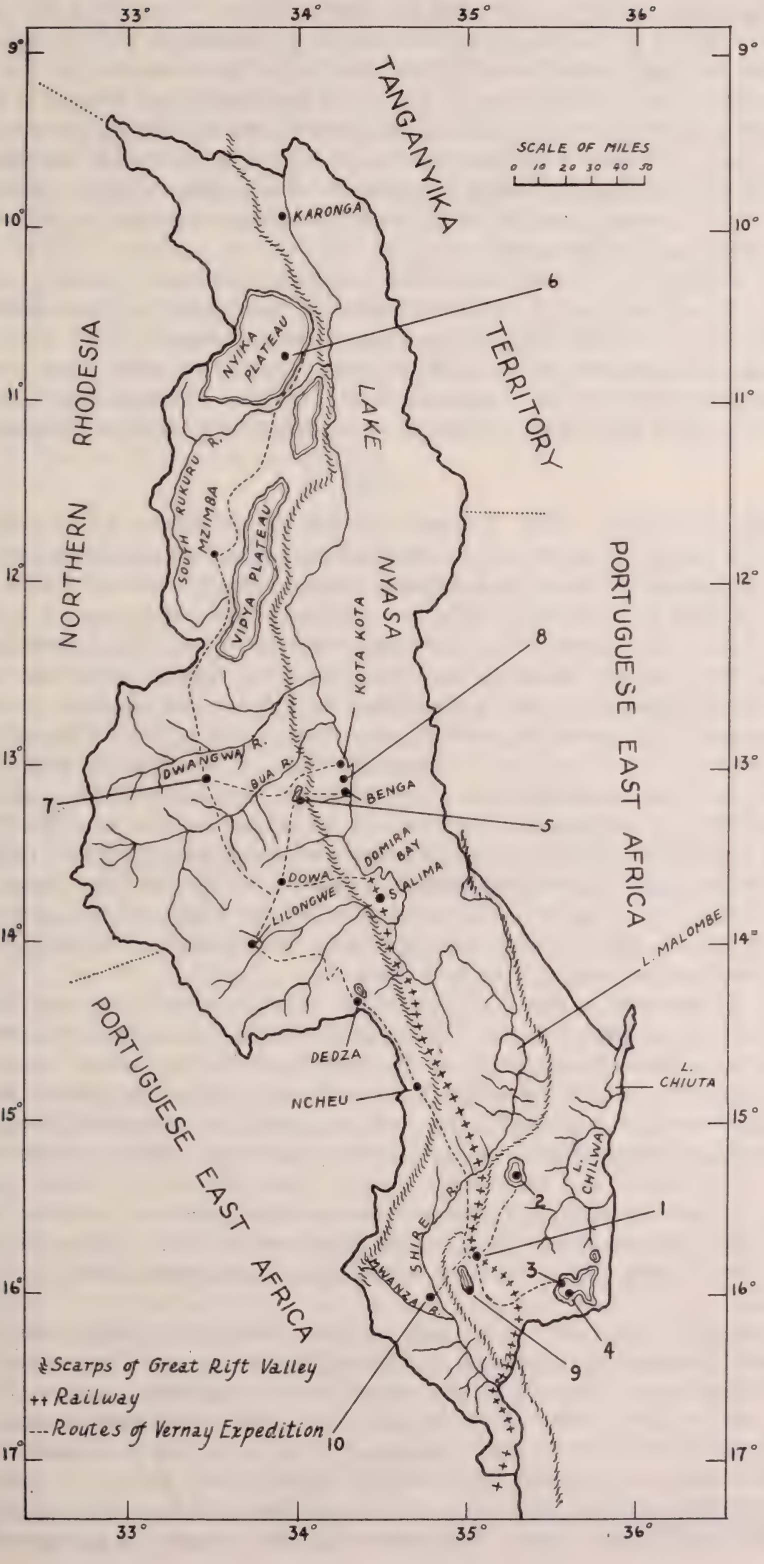
Explanation of map on page 163

Map of Nyasaland showing routes and principal collecting localities of the Vernay Nyasaland Expedition. 1. Blantyre, Shire Highlands. 2. Zomba Plateau. 3. Likubula Gorge. 4. Luchenya Plateau, Mlanje Mountain. 5. Nchisi. 6. Nyika Plateau. 7. Kasungu. 8. Camp Chibotela, Chia area. 9. Cholo Mountain. 10. Chikwawa.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NORTHERN RHODESIA
RUKURU R.
SOUTH MZIMBA
VIDYA PLATEAU
LAKE NYASA
KOTA KOTA
PORTUGUESE EAST AFRICA
DWANGWA R.
BUA R.
BENGA
DOMIRA BAY
SALIMA
DOWA
LILONGWE
DEDZA
NCHEU
L. MALOMBE
L. CHIUTA
L. CHILWA
SHIRE R.
MWANZA R.
1
2
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10
Scarps of Great Rift Valley
++ Railway
--- Routes of Vernay Expedition

the Angoniland plateau, and near the northwestern shores of Lake Nyasa. The Karroo beds of the north have been found to contain a rich vertebrate fauna. Dinosaur beds of probable early Cretaceous age occur within the Rift Valley to the northwest of Lake Nyasa. A series of lacustrine and fluviatile beds along the northwestern shores of Lake Nyasa throws much light on the earlier history of the lake. The oldest of these beds may possibly date back into the Tertiary. Succeeding beds have yielded a number of mammalian remains (mastodon, elephant, hippopotamus, giraffe) which together indicate an early or possibly middle Pleistocene age for these beds.

The earlier crustal movements which resulted in the step-faultings responsible for the Nyasaland part of the Great Rift are considered to have taken place in pre-Pliocene, probably Oligocene, times. The movements have continued intermittently and have not yet come to an end. Volcanic activity associated with the rift-forming movements has ceased in Nyasaland, although hot springs occur, usually on lines of fracture belonging to the rift valley system of faults.

CLIMATE

Dixey (1932) has given a resume of the palaeoclimate of Nyasaland as revealed by study of the rock formations. The glacial conditions under which the earlier Karroo strata were laid down in more southerly parts of Africa apparently did not extend to Nyasaland. After the cold conditions there was a warmer phase which led to the growth of a luxuriant vegetation and the deposition of coal-bearing strata in our area. Toward the end of the Karroo period the climate became increasingly drier and warmer until finally desert conditions existed over the whole of Nyasaland in common with the greater part of Africa. In Dinosaur times, moister conditions again returned. Within Tertiary and post-Tertiary times several major alternations from drier to wetter conditions took place. There is evidence for the correlation of certain of the wetter periods with the Pleistocene glacial period of Europe, the colder phases of which were probably represented in our area by greatly increased humidity. One period in the Lake Nyasa sequence of lacustrine beds, indicated by recession of the lake and the accumulation of fine red sands, may possibly correspond to the Rhodesian desert period, during which the Kalahari sands were laid down.

The present-day climate of Nyasaland is characterized by and large by alternating wet and dry seasons, with abundant rainfall in summer and scanty rains, and in some areas no rain at all, in the cooler months. The rainy season generally begins about the end of November and continues to about the end of March. January and February are generally the wettest months and May through September almost equal in dearth of rain. In the northern part of the country the wet season begins a little earlier and ends about a month later than in the south. On the higher mountains, and on adjacent parts of the elevated plateaux on either side of the Rift Valley, the southeast trade winds bring spells of mist and cold rain, called "chiperoni," from which there is often appreciable precipitation in the winter months.

As might be expected in an area of such diverse topography and differentiation in elevation of the land surface, rainfall varies greatly. The annual fall ranges from an average of about 25 to 30 inches in the Lower Shire Valley, which is the driest part of the Protectorate, to about 110 inches recorded at an altitude of about 6,000 feet on Mlanje Mountain, where there is no very pronounced dry season.

Temperature and atmospheric humidity likewise vary greatly in relation to altitude and other controlling factors, and, like the rainfall, temperatures vary considerably in different years. The hottest time of the year is in November, before the start of the heavy rains, when shade temperature Fahrenheit rises to 105°-112° and even 120° in the sweltering valley of the Lower Shire, to 100°-105° on the plains of Lake Nyasa, and 90°-95° or rarely over 100° on the plateau highlands. In the coolest months—May, June, and July—standard temperatures drop to lows of about 50°-55° on the Lower Shire, and about 40°-50° on the plateau highlands, where the winter climate is cool and bracing. Frosts occur not infrequently on the more elevated plateau highlands. Heavy falls of snow have been reported at intervals of years on the upper levels of Mlanje Mountain.

Hornby (1933) recognizes two primary climatic regions for Central Nyasaland, viz., 1) the dry areas of the Shire-Valley-Lake-Nyasa basin up to 2,300 feet, with a rainfall of 20 to 40 inches, and 2) the high plateaux flanking the Rift, with a rainfall of 40 to 60 inches. In terms of tolerance to Europeans, the climatic divisions of Nyasaland as a whole may be considered as 1) the hot, unhealthy lowlands of the Shire and Lake Nyasa, 2) the relatively cool and healthy plateaux, and 3) the higher mountains which from August to November offer a pleasant retreat from the heat of the two lower regions.

SOILS

In addition to extensive areas of residual and alluvial soils fairly uniform in character, there are, within small areas, heterogeneous groups of soils due to differences in the parent rocks and also the arrangement in catenae of soils transported from the heights of land to the lower levels. Thus, in the prevailing dry woodlands, where soil preferences of the plant communities are more marked than in moist closed forest, extensive tracts are covered with vegetation monotonous in its uniformity, while significant and even very striking changes in plant cover often occur within quite small areas.

An increase in available soil moisture along the edges of streams and watercourses will bring in narrow strips of closed forest of various types. Ravines, rocky slopes, and rock outcrops often support, as isolated communities in the prevailing woodlands, closed forest or related brushy growths which appear to be edaphic, although protection from fire might also be a factor involved. In the Shire Valley and on the lake plains, especially, local soil differences apparently are responsible for abrupt changes from open woodland to dry closed forest. The large termite mounds characteristic of most of the woodlands often support brushy growths of species which are absent from the surrounding vegetation, presumably because of their soil requirements. Certain plants of the termite mounds, such as *Sansevieria* spp., appear to be restricted to this limited habitat, while others, such as the baobab tree, are not. Large baobabs (*Adansonia digitata* L.) are frequently found perched on the eroded remains of old termite mounds in the Shire Valley.

The principal soils of the broad plateaux which flank the Rift Valley are red or reddish loams. Dixey (1928) points out that the more densely populated areas on these plateaux and on the scarps of the Rift coincide with the graphitic gneiss and crystalline limestone series of the crystalline rocks, and he contrasts the red fertile soils of the graphitic gneisses with the pale, very sandy, dry and sterile soils derived from granites, granulites, and acid gneisses. Dixey also states that the poor soils of the sandstones, grits, quartzites, and marls of the older sedimentary formations are almost unpopulated.

TYPES OF VEGETATION

The intricacies of Nyasaland's vegetation pattern are comparable with the diversities of topography, geology, climate, and soils in the country. On the broadest view, the vegetation cover may be said to consist of closed forest, open forest or woodland, and grassland, with types of open forest occupying by far the greater part of the area.

Shantz' vegetation map (1923) is unsatisfactory for this part of Africa, especially in that it shows the greater part of Nyasaland as occupied by his "Acacia-tall grass savanna" instead of his "dry forest." Topham (1936), viewing the vegetation of Nyasaland as a forester with extensive personal experience in the area, has distinguished 26 "main plant communities which contain trees and shrubs," and grouped them as follows:

1. Forest types in the high mountain areas, above 5,000 feet (4 communities).
2. Forest types on the lower mountain and plateau areas, between about 5,000 and 2,000 feet (4 moister and 13 drier communities).
3. Forest types of the rift valleys (5 communities).

In this very useful preliminary classification Topham designates characteristic tree species for each of his 26 communities and includes valuable notes on climate, soil, economics, and the incidence and effects of human disturbance.

Willan (1940), in a vegetation map of the Protectorate, has applied the following broad physiognomic and floristic grouping of types of plant cover:

1. Montane Rain Forest and Grass Land
2. Brachystegia Woodland
3. Brachystegia and Combretum [forest and woodland?]
4. Pterocarpus-Bauhinia Foothills Forest
5. Forest and Woodland of the Lake Plain and Shire Valley

The montane grassland of Willan no doubt is very largely a secondary condition following the destruction of his montane forest by fire and in some degree clearing for cultivation by the natives.

Willan suggests that the *Brachystegia* woodlands, which occupy most of this part of Africa, might perhaps be a secondary, degenerate type of vegetation resistant to conditions brought about by man's activities in cultivating and burning over a very long period of time. Gillman (1949) takes the opposite view for the *Brachystegia*-Other-Species Woodland which occupies almost one-half of the land surface of Tanganyika and is present on nearly every geological formation. He considers this woodland a function primarily of climate; a view subscribed to by the present writer.

DISTURBANCE OF THE VEGETATION BY MAN AND FIRE

Having traveled in Nyasaland, I can not agree to the statement in William Vogt's book (1948) that since 1880 the vast forests which covered northern Nyasaland have been destroyed by native farmers, and that the Shire River has been filled with silt. The statement in question is based on a report by Lord Hailey which I have not seen. But, plainly, exaggeration has crept in somewhere along the line of information. Nyasaland is still a country in which a road journey from end to end leaves a dominating impression of trees in an open forest environment, and this is especially so in the north. There has been some general silting in the Shire, and bars have obstructed its upper course, but as seen late in the dry season of 1946 the river was flowing a strong stream, and its lower course was still passable by river steamers to the former head of navigation.

That large areas of land have been changed by human activities, and that the destructive processes and their certain results are being accelerated through increasing population pressure, there can, however, be no doubt. The local congestion of population and consequent deterioration of the vegetation cover and soil through cultivation, and through overgrazing in some tsetse-free areas, has come about largely in recent years. A big increase in population has taken place since the suppression of the slave trade and the taming of the Angoni, a raiding Zulu tribe, brought security to the people, and since health and social conditions have been improved by actions of government and of the Christian missions.

Total population increased from 1,293,000 in the census year of 1926 to 2,050,000 in the census year of 1945. The native population of 2,044,000 (1945) lives by subsistence farming of maize, finger millet, cassava, beans, and lesser food crops. Increasing production of tobacco, cotton, maize, etc., as native money crops, throws an additional burden on the land which can be cultivated under present conditions. Tea, tung, tobacco, and lesser crops grown by European planters occupied only about 48,000 acres of land in 1945.

The crops of the natives are produced almost entirely by primitive hoe-and-hill methods of shifting plot agriculture. Nearly all of this cultivation is carried out on woodland or drier-forest soils, where the seasonal rainfall usually is ample for the crops grown in the country. Through repeated disturbance for cultivation, densely peopled areas have to a great extent been cleared of timber; the soil is being or has already become impoverished, and on sloping land it is being carried away by sheet and gully erosion. Wind erosion is also to be seen on some light soils of the western plateau. In areas less densely populated, woodland conditions often are reestablished between periods of cultivation, but in varying degree it is a changed vegetation, and probably a long term of years is required for full restoration of the ecological equilibrium. Cultivation does not always involve total preliminary clearing of the land. A common practice in woodland is to fell the trees at a convenient cutting level, burn the tops, and leave the stumps, which in *Brachystegia,* for example, regenerate freely by coppice shoots.

Topham (1936) states that some 90 per cent of the area of Nyasaland bears signs of having been cultivated by the natives at some time or other. This statement seems open to question. Probably 10 per cent of the land is too steep and rugged for cultivation as at present practiced or indicated for the past; further areas are too infertile to attract occupation, and large tracts are too remote from sources of domestic water supply to be available for cropping.

The distribution of the native population in relation to domestic water supply is brought out strongly in a study made by Dixey (1928). On 1926 census figures, average population density was 34.6 per square mile, but density was from no inhabitants to 10 on 66 per cent of the area, and from 101 to over 200 on 8.5 per cent of the area. The denser concentrations of people are along the lake shores, the banks of the principal rivers, and in localities where water from springs or other sources is readily available for household use and soils are good. Very extensive tracts of practically vacant fertile land only await provision of water from wells, boreholes, or dams to bring them into use for cultivation, and thus provide relief for congested areas and provide adequate living space for the rapidly growing native population.

A start has been made by government in sinking wells in areas in which the need is most urgent. A program to educate the natives in improved methods of agriculture and in soil conservation is under way. This, however, is made slow and difficult by native conservatism, the lack of chiefly authority since the early breaking of the power of the big chiefs, and shortage of funds.

The opening of new lands for native settlement will result inevitably in the disturbance and alteration of vegetation now virgin as far as cultivation and grazing by domestic animals go, and the further spread of actual deforestation. How far this will, and must of necessity, be allowed to take place, and to what extent measures can be taken to proclaim and maintain forest reserves for the supply of forest products and the maintenance of stream flow, are problems as much for present as for future consideration.

The montane rain forests have already in large part disappeared and been replaced by grass. In some cases this deforestation has advanced up the slopes with clearing for cultivation, leaving the higher elevations crowned with forest. Fire apparently has been the chief agent of complete deforestation over large areas on the extensive uplands of Nyika and Vipya, and over smaller areas on such mountains as Mlanje. Although the Nyasaland native dislikes and if possible avoids the cold of the high elevations, cultivation there in times before the advent of the white man can not be ruled out in accounting for the change from moist closed forest to grassland conditions. The Nyika Plateau, with an area of about 900 square miles at 7,000 to 8,000 feet elevation, carries today the remnants of what is known to have been a much larger population which lived there and cultivated gardens after being driven from the lower country by the Angoni. The Vipya Plateau, with an area of about 1,100 square miles at 6,000 to 7,000 feet, is at present uninhabited, as is Mlanje, and all the high uplands and mountains except Nyika. The seemingly fertile rolling uplands of Nyika and Vipya are considered suitable for European settlement.

The long-range effects of fire on the various types of open forest or woodland are not easy to determine, and opinions differ in Nyasaland as elsewhere. In Nyasaland, however, certain deleterious effects are recognized officially. Annual burning of the grass by the natives is not discouraged, but by law it must be done within a prescribed period after the wet season; not later than about August or September, according to locality. Fires up to about this time of year do not burn the grass completely, and the underground parts are not damaged. Fires later in the dry season may leave the ground bare, scorch the trees, and expose the soil to accelerated erosion by the heavy rains with which the wet season usually begins. Regulations notwithstanding, much burning of grass is done late in the dry season, when a pall of smoke lies over the whole country and lines of fire light the mountainsides at night.

In areas such as Nyasaland, where shifting woodland agriculture is practiced, much necessary burning is done in clearing land for cultivation. Hunting peoples, everywhere, burn the grass to induce the growth of fresh young feed which attracts game to the burned-over areas. Herdsmen and shepherds, and the owners of free-ranging domesticated animals, burn the grass for the benefit of their herds and flocks. When large numbers of free-ranging animals are the consideration and watering places few, extensive tracts are burned so that the animals will be attracted away from the waters and by spreading over the back country be assured of sufficient feed in the dry season and be less subject to insect pests. Travelers on foot, on animal-back, and in motor vehicles, burn to clear their route in open country, whether it be by path, bush road, or across trackless wilderness. In regions inhabited by dangerous wild animals, burning is practiced to destroy cover around houses and villages, food gardens, fishing places, the places from which the domestic water supply is carried, and routes in regular use.

This purposeful firing is done at any time the grass is in condition to burn, but there is much piecemeal burning early in the dry season, when fires in years of normal rainfall will not travel far. The hunters and herdsmen know they will get the best growth of green feed by burning while the ground is still moist after the seasonal rains. It is to the best interests of the hunters, moreover, to burn patches on which game will concentrate to feed, rather than fire the whole countryside. Travelers using regular routes, and people who burn as a personal safety measure, do their firing as soon as the grass will burn.

Much burning in connection with land clearing is done well on in the dry season, when the ground is broken in preparation for planting after the rains begin. It is then, when soil and ground cover are very dry, that there is most danger of the fire getting away, and if it does leave the clearing and spread to woodland or grassland, the chances are that no very strenuous effort will be made to stop it. Late-season fires of such origin, or those started by irresponsible travelers or the inevitable "fire-bug," often spread over large areas of country. Often, too, they will be stopped at the edges of areas burned over earlier in the season, or be checked on unburned territory that has been heavily grazed and trampled by domestic animals, and go out when the wind dies down in the evening. But in any inhabited area of woodland or grassland in which fire control is not rigidly enforced, or the grass is not kept down by very heavy grazing, most of the country will be burned over at some time during the dry season and grass which escapes fire one year will almost surely go up in smoke during the next year.

Speculation as to the effects upon vegetation of fires lit by man have been carried far, with, it seems, too little appreciation of the fact that far reaching fires often are started by lightning in semiarid regions, and that fire therefore should rightly be regarded as a natural factor of the environment in such regions.

In country uninhabited and unvisited by man there are no checks to the spread of fire other than natural features such as streams and open bodies of water, marshes and swamps, tracts of non-inflammable vegetation, and barren ground of one kind and another. Under conditions of this kind, fires started by lightning are likely to travel farther and perhaps do more damage to vegetation than in inhabited regions where early burning is practiced and other types of firebreaks are produced.

Grass-fires started by lightning may occur at any time during the dry season. Ephemeral "fire-grasses" will burn soon after the rains, but they are usually restricted to habitats of small area unfavorable for the prevailing perennial grasses. It is not until the dry season is well advanced that, in a normal year, the main body of grasses is so dried out that it is in condition to carry a fire that will burn day and night and sweep over large areas of territory. And this is the time when lightning is most frequent; the time of the dry storms with severe lightning, crackling thunder, wind, but often not a drop of rain to moisten the grass and so prevent the spread of any fire that is started during the disturbance. Fires started in this way will sometimes burn for weeks, until doused by rains from other thunderstorms or the first rains of the wet season proper. Such fires, undoubtedly started by lightning during dry thunderstorms, are to my personal knowledge common in northern parts of Australia, under conditions of climate, and woodland or open forest vegetation, comparable to those prevailing over much of Nyasaland and tropical Africa.

Fires started by lightning will not occur as frequently as fires lit by man, but in areas where they are the only fires, and the country escapes burning for a time, the fires when they do occur will be all the more intense and harmful to vegetation owing to the accumulation of dead and dry material from more than one, and perhaps several, seasons of growth.

PREVIOUS BOTANICAL COLLECTIONS

The first collections of plants to come out of the area now called Nyasaland were from the Livingstone expedition of 1859 and a second expedition led by

Livingstone in 1861–1862. These important collections, made by John (afterwards Sir John) Kirk and J. C. Meller, were transmitted to Kew. Burkill (1897), in listing the plants known from "British Central Africa" up to near the end of the century, gave the names of no less than 19 collectors, other than Kirk and Meller, who collected in localities in Nyasaland and sent their specimens to Kew. The most important of these collections were the work of John Buchanan (990 species), Alexander Whyte (500 species), and G. F. Scott-Elliot (246 species, including collections from the "Nyasa-Tanganyika Plateau").

Additional knowledge of the flora has been gained through a considerable number of more recent collections of varying importance, some made by foresters and other government officers, some by private individuals, and deposited principally in herbaria in Britain, and at Pretoria and Amani. An herbarium of ligneous plants is maintained by the Forestry Department at Zomba, capital of Nyasaland. Among the largest of the recent collections may be mentioned those of J. Burtt Davy, made on the Imperial Forestry Institute Expedition of 1929, and collections made mostly on the Shire Highlands by Mrs. C. W. Benson and sent to Pretoria.

Knowledge of the flora of the higher mountains, before our expedition, appears to have rested mainly in collections from Mlanje Mountain made by Alexander Whyte in 1891 (Britten et al., 1894), and unpublished collections from the same mountain made by P. J. Greenway in 1941 and A. P. T. Forbes in 1942. The Greenway and Forbes collections were deposited at Amani (removed to Nairobi in 1950), and duplicates of the former were sent to Kew and Pretoria.

ITINERARY

The Vernay Expedition was planned to pay special attention to the higher mountains on both sides of the Great Rift Valley. An extensive system of dirt roads, some of them all-weather motor roads, others passable only in the dry season, made all parts of the country that we wished to visit easily accessible, at least to the lower slopes of the mountains. Sufficient numbers of local natives were available for porter transport to the higher altitudes. Other native Africans, employed as field assistants and camp servants for the duration of the expedition, proved themselves cheerful and for the most part reasonably energetic and efficient helpers.

A $1\frac{1}{2}$-ton truck, and camp gear and collecting supplies, were shipped in advance from New York to Beira, in Portuguese East Africa, and railed thence to Blantyre, on the Shire Highlands in southern Nyasaland. Captain Shortridge, with two colored assistants, Nicholas Arend and Matthew Swarz, traveled from South Africa to Blantyre by rail, bringing their equipment by that route. Mr. Vernay, Dr. Anthony and I flew by commercial airlines from New York to Blantyre, where we met Captain Shortridge on May 20.

A small amount of collecting was done on the Shire Highlands while organizational arrangements were being made at Blantyre, chief commercial center of the Protectorate, and at Zomba, the seat of government. On May 27, our first field base was established at an elevation of about 5,000 feet on Zomba Plateau. A narrow, zigzag road, about six miles long, climbing from Zomba town to the edge of the plateau, had been made unsafe by a landslide, and transport for half the distance was by native carriers. Returning to Blantyre on June 11, we did some further collecting there during a spell of chiperoni weather which interrupted our planned itinerary.

On June 19 we moved by road a distance of 41 miles to the lower western slopes of Mlanje Mountain, and established a collecting and transport base at a timber depot of the Forestry Department, at an altitude of about 2,750 feet in the mouth of Likubula Gorge. From there Dr. Anthony and I made a preliminary reconnaissance of the mountain, and on June 24, with 57 carriers, we again ascended the steep slopes and in four hours reached a forester's cottage at about 6,100 feet on an upland known as Luchenya Plateau. Collecting, in which Mr. Vernay took part for several days, was carried out from the forester's cottage until July 18, when we rejoined the rest of the party at Likubula base and all returned to Blantyre.

So far, our work had been confined to the eastern side of the Rift and to southern parts of the Protectorate. On July 22 we left Blantyre in two groups for travel to Nchisi, on the western side of the Rift and in the Central Province. Captain Shortridge, with most of the stores and personnel, went by train to railhead at Salima, on Lake Nyasa, and from there by truck. The rest of us traveled by road, breaking the 270-mile journey with an overnight stop at Dedza, about half way. A disused government bungalow at Nchisi was headquarters for collecting from July 23 to August 7. For several weeks after that the expedition was divided into two and sometimes three parties in order that both large and small mammals, and plants, could be collected in different localities each offering special attractions. Under this arrangement, mammal collecting was carried out at Kasungu, and at Kota-kota and in the Chia country on the Lake Nyasa plains.

With my three native assistants and a cook, I left Nchisi by truck on August 8 to collect on Nyika Plateau, in the far northern part of the country. The journey of 295 miles occupied a day and a half, with an overnight break at Mzimba. Starting with 25 carriers from Nchena-chena, an agricultural experiment station at about 4,200 feet on the southeastern slopes of Nyika, a camp site at approximately 7,700 feet on top of the plateau was reached in three hours on the 10th of the month. I returned to Nchena-chena August 20, and started on the road back through Mzimba two days later.

At Kasungu, on August 23, I joined Captain Shortridge, who was examining this area for small mammals. We moved to Nchisi on the 29th, and the following day descended the escarpment of the Rift to Chibotela village, in the Chia area of the lake plain, where Mr. Vernay and Dr. Anthony were hunting big game. Plants were collected in the Chia up to September 7, then again at Nchisi and nearby Chintembwe, and at Chenga Hill nine miles to the southwest, until the commencement of our return journey to Blantyre on September 13.

The most important part of the work of the expedition having then been accomplished, Mr. Vernay returned to the United States.

Field work was resumed in the Southern Province on September 18, when Dr. Anthony and I set up camp at an altitude of about 4,000 feet on Cholo Mountain, on the eastern rim of the Rift some 30 miles south of Blantyre by road. Captain Shortridge spent a week with us at Cholo, and then was obliged to return to Blantyre, ill with malaria and dysentery.

On October 1, we broke camp at Cholo, and traveling by way of Blantyre, went down into the bottom of the Rift and crossed the lower Shire River to Chikwawa, about 350 feet above sea level. From headquarters at the government station at Chikwawa, we spent five days in collecting west toward the Portuguese border and south as far as the lower Mwanza River. The field work of the expedition in Nyasaland ended with our return to Blantyre on October 7.

COLLECTING LOCALITIES

Shire Highlands. Only a few plants, totalling 52 numbers, were collected on the Shire Highlands, in the vicinity of the towns of Blantyre (3,400 feet) and Zomba (3,100 feet). The area has received far more attention from botanical collectors than any other part of the Protectorate, and by this time it might be expected that the flora is fairly well known. The "Mananja Hills" gatherings of Kirk, Meller, and others, came from the Shire Highlands, as did the bulk of Buchanan's and Mrs. Benson's plants, to mention only a few of the more important collections.

The area consists of attractive ridgy *Brachystegia*-Other-Species woodland country, and is heavily populated, especially in the neighborhood of Blantyre. The high Zomba plateau or upland, and Mlanje Mountain, rise from its edges. Elsewhere, isolated rocky-topped mountains, sharp pointed or with small plateaux on their tops, rise to elevations of up to 5,000 feet or more above sea level and bear patches and gully strips of dark closed forest and brushwood about their summits. On the highest of these mountains, Chiradzulu (5,300 feet), Alexander Whyte made plant collections in the 1890's.

The demand for land for cultivation by the very numerous native population (over 200 to the square mile in some sections), has led bit by bit to what amounts to virtual removal of the woodland vegetation from land that is suitable or available for cropping. In the aggregate, however, a considerable amount of woodland survives, on apparently fertile soils perhaps without water or on land owned by European interests, as well as on the poorer slopes of ridges and mountains. These woodlands show marked local variation in type and floristics, and with brushy evergreen growths found on rocky ridges, strips of depauperate rain forest along some streams, and the small closed forests of the mountain tops, the area is rich in species of plants.

When we arrived in this part of the country late in May, the stalks were dry in the maize patches of the natives and most of the crop had been harvested and stored in the straggling villages and hamlets of mud-walled and grass-thatched huts. The roads were already dusty. Everywhere the red soil looked dry and hard. Small patches of grass had been burned. But in general the tall bunch grasses remained green in their lower parts though browning on top and ripening seed, and numerous Compositae, Labiatae, and other herbs were flowering in the grass. Most of the woodland trees were in fruit at that time, but few bore flowers.

Records for the period 1892–1916 indicate an average annual rainfall of 49.1 inches at Blantyre, 55.58 inches at Zomba; mean Fahrenheit temperature at Zomba 67.1°, and absolute maximum and minimum 102° and 41° respectively (Hornby 1933). Climate and soils are suited to a wide variety of crops, and cattle do well on the Shire Highlands. Tobacco, tung, and upland cotton are grown successfully as plantation subjects. Food crops of the natives, in addition to maize or mealies, the main staple, include Kaffir corn, various beans, cassava, sweet potatoes, Irish potatoes, pumpkins, pigeon peas and bananas. Also commonly grown in native or European gardens are peas, cabbage, tomatoes, strawberries, papayas, mangoes and citrus fruits. Most of the common annuals of temperate climates can be seen growing with tropical and subtropical trees and shrubs in the ornamental plantings of European gardens. Plantations of *Eucalyptus saligna* show very good growth.

Zomba Plateau. This is the best known of the isolated uplands of the Protectorate which in their relatively cool and moist environmental conditions, and their flora, provide striking contrasts with the rest of the country. Plants were collected here by Kirk in 1859, plants and birds by Whyte in 1891, and other early collectors, including Buchanan, visited the plateau. The collections of the Vernay Expedition, made from May 28 to June 10, totalled 288 numbers.

Zomba Mountain is a prominent intrusion of syenite, about 12 miles long and up to 5 miles wide, rising to a maximum height of 6,647 feet from the northern end of the Shire Highlands and the eastern rim of the Rift Valley, its steep sides culminating in places in sheer bare cliffs. Most of its summit is occupied by three plateaux: the main Upper Plateau with an elevation of about 6,000 feet; the northern Mlosa Plateau, smaller but of about equal height; and on the southern part of the mountain a ridgy shelf of about 5,000 feet, called the Lower Plateau. Drainage from the main and lower plateaux is by the fast, rocky Mlungusi stream, which drops down the slopes in a short gorge and provides water for Zomba town, at the foot of the mountain.

The mountain top is a forest reserve, and about 40 miles of footpaths lead to most parts of the uplands. Parts of the Lower Plateau and the slopes above it are occupied by fine plantations of Mlanje cypress *(Widdringtonia whytei)* and experimental plots of exotic conifers. Trout introduced into the Mlungusi stream provide sport for the angling fraternity of Zomba.

We were fortunate in having for our base one of several summer cottages on the Lower Plateau, which also had good quarters for our native helpers. Days had been pleasantly warm and nights crisply cool on the Shire Highlands. On Zomba we were glad of warm clothing in the field, and log fires in the evening. Our arrival was followed by two drear days of mist, drizzle, and rain, then eight fine days with or without morning mists, succeeded by another four days of wretched chiperoni weather at times too wet for field work. This second spell of bad weather continued for five days after we left the mountain. Maximum shade temperature on our cottage veranda ranged from 55° to 78°, minimum from 47° to 50° F. Average annual rainfall on the Lower Plateau is said to be about 70 inches.

Woodlands of *Brachystegia*-Other-Species type, ascending from lower levels, occupied the drier outer parts of the Lower Plateau. Tree stocking was chiefly of *Brachystegia spiciformis* Benth. and *Afrormosia angolensis* (Bak.) Harms, up to about 30 feet tall, with usually crooked stoutish boles, and somewhat flat-spreading crowns which formed a fairly continuous thin canopy well above the ground. Associated smaller trees included two species of *Protea* and one of *Faurea.* The ground cover of erect perennial bunch grasses, generally 3–5 feet tall, consisted largely of *Hyparrhenia lecomtei* (Franch.) Stapf, *H. cymbaria* (L.) Stapf, *H. gazensis* (Rendle) Stapf, *Loudetia simplex* (Nees) C. E. Hubb., **Andropogon sylvaticus* C. E. Hubb., and *Melinus ambigua* Hack., forming a dense stand in well lighted situations and thinning under shade. There were few young trees or shrubs. Compositae and Labiatae figured prominently in a wealth of mostly tall perennial and annual herbs in flower amongst the grasses, of which *Helichrysum kirkii* Oliv. & Hiern, *Vernonia hoskeana* Vatke & Hildebr., *Senecio hochstetteri* Sch. Bip., *Acrocephalus callianthus* Briq., *Leucas milanjiana* Guerke, *Borreria dibrachiata* (Oliv.) K. Schum., and *Lefebvrea brevipes* Engl. may be mentioned as examples. Orchids of several species, all sterile, were common as epiphytes.

The edges of bluffs and other open rocky situations provided habitats for such succulent plants as *Aloe* 16273, with dense racemes of orange-red flowers bent horizontally, *Crassula ? argyrophylla* Diels, and matted *C. globularioides* Britten and *Aeolanthus serpiculoides* Bak.[1]

Rain forest occurred in a strip along the course of the Mlungusi on the Lower Plateau, in gullies and gully heads, and in fairly extensive patches on sheltered slopes rising to the Upper Plateau. Not one of the few tree species forming the canopy layer of these forests was found in flower. *Albizzia gummifera* (Gmel.) C. A. Sm., common in gullies, and *Bersama abyssinica* were fruiting. In the moist, deep shade of the forest along the Mlungusi, tree trunks, undergrowth and rocks were thinly mossed, and an abundance of ferns included a fine tree-fern *(Cyathea)* and giant *Marattia salicifolia* Schrad., the latter forming clumps 10 or 12 feet high. Among other ground ferns, *Osmunda regalis* L. grew on wet sandy beaches, and species of *Asplenium* and *Dryopteris* were much in evidence. Other aspleniums grew plentifully on trees and rocks with the climbing ferns *Arthropteris monocarpa* C. Chr. and *Oleandra africana* R. Bonap., *Peperomia* species, *Streptocarpus goetzei* Engl., and masses of orchids then without flowers. A reddish-pink balsam (*Impatiens* 16043) made patches of color on open banks. On the wet rocks of a cascade in the forest were quantities of a little reddish plant (16301) of the Podostemaceae.

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[1] For observations on succulent plants met with on the expedition, see Anthony 1949.

Rain forest second growths, in various stages of development, pointed to a formerly much more extensive representation of primary forest on the Lower Plateau and slopes above it. *Myrica* 16316 was one of the principal trees in the older second growths. Smaller trees or large shrubs of the younger growths, and grassy edges of primary forest, included *Kiggelaria africana* L., *Dodonaea viscosa* L., *Hypericum lanceolatum* Lam. with big yellow flowers, and the heath, *Philippia benguelensis* (Engl.) Welw. Also common in this community were *Rubus ellipticus* Sm. with robust red-hairy canes and white flowers, *R. rigidus* Sm. with purple flowers, *Anthospermum herbaceum* L. f., and *Dissotis princeps* (Bonpl.) Triana with showy deep purple blooms.

The Upper Plateau was mostly treeless rolling grassland with relic clumps and patches of dark green low forest here and there in the heads of gullies and around the edges of a big quaking bog which gave rise to the main stream of the Mlungusi. The whole plateau must at one time have been covered with montane rain forest, except for a few rocky crests, the bog, and the boggy courses of streams. Whether deforestation came about through fire or cultivation by natives, or both, does not seem to be known with certainty. Stories are current that, before the coming of the white man, refugee natives occupied the plateau and cultivated the land. The grasses formed a thick body growing about knee-high. Their clumped habit made for rough walking, and every now and then one stumbled into a hole dug by natives to unearth a large mole-rat called fuka (*Heliophobius*) which they sought for food. These holes were anything up to two feet deep in the fertile-looking red soil. The natives from below also visited the plateau to dig the tubers of an orchid (*Disa zombica* N. E. Br.) which they used in the preparation of a slimy dressing for their mealie porridge. A flat-topped tree-fern (*Cyathea* 16137), looking much like a cycad from a distance, occurred on the dry banks of streams far from any forest, and recalled the fire- and frost-resistant species of the genus found on the high mountains of New Guinea. This particular tree-fern appeared to be identical with a species which grew in the closed forest of both the upper and lower plateaux.

Few trees of the forest relics of the Upper Plateau were in fertile condition, but *Lachnopylis sambesina* (Gilg) C. A. Sm., *Podocarpus milanjianus* Rendle, and *Agauria salicifolia* (Comm.) Hook. f. were collected. *Polygala virgata* Thunb. and *Crotalaria goetzei* Harms were conspicuous shrubs of forest borders. A *Vellozia* with thick fibrous stem and branch-end rosettes of narrow leaves grew commonly as a small tree on rock outcrops with the aromatic shrub *Myrothamnus flabellifolius* Welw. Common bog plants included the sedges *Ascopelis capensis* (Kunth) Ridl. and citronella-scented *Scleria pulchella* Ridl., *Drosera madagascariensis* DC., and creeping *Lycopodium carolinianum* L. The open grasslands carried a poor flora. The principal grasses had dropped their seeds; the most conspicuous herbs were grey-leaved *Helichrysum nitens* Oliv. & Hiern, *H. buchanani* Engl., and *H. adscendens* (Thunb.) Less.

Mlosa Plateau was not visited by any of our party. It was much smaller than the main upper plateau, but it seemed to carry more forest.

Likubula Gorge. The timber depot which by courtesy of the Forestry Department we used as a base camp was pleasantly situated in *Brachystegia*-Other-Species woodland at an altitude of about 2,750 feet, where the Likubula River debouched from the funnelled mouth of a tremendous gorge on the western side of Mlanje Mountain. Below the depot, to the west, was the broad 2,100-foot Tuchila Plain, lying between the mountain and the Shire Highlands. Behind it the mountain rose in steep pediments topped by stark grey rock walls of great height. Close to the north, Chambe Peak (8,289 ft.) of the mountain presented an almost perpendicular rock face of about 6,000 feet. Mammals were collected here between June 19 and July 18, but only one day could be spent in botanizing. Including some collections made by Mr. Vernay, 40 numbers of plants were taken in the locality.

The Likubula, rocky and swift, and containing deep pools between cascades and bouldery stretches, had mossy banks shaded by lines of rain forest trees. Two rheophytic small trees, *Mascarenhasia variegata* Britt. & Rendle and **Diospyros* 16385, with horizontal branches, grew on floodswept edges of the stream. The golden-yellow flowers of *Bidens steppia* (Steetz) Sherff made a conspicuous showing on moist sandy banks. Notable among trees of the woodlands near the river were big-leaved *Uapaca kirkiana* Muell. Arg., smaller-leaved *U. nitida* Muell. Arg., *Strychnos innocua* Del. bearing edible round fruits the size of a small cannonball, and *Vernonia polyura* O. Hoffm., of small-tree size and covered with a mass of pale purple flowers that showed above the tall grass.

Mlanje Mountain. Mlanje, highest mountain in Nyasaland, has received a good deal of attention from geologists since deposits of bauxite were discovered upon it in 1924, and the mountain has been described by Dixey (1927). Biological exploration of the upper levels appears to have begun on October 20, 1891, when Alexander Whyte started a fortnight's collecting for plants and birds at altitudes between 6,000 and 8,000 feet. Burkill (1897) listed a few high-altitude plants obtained on Mlanje by J. McClounie. P. J. Greenway collected about 125 numbers on the mountain in 1941, A. P. T. Forbes about 165 numbers in 1942. The Vernay Expedition plant collections, made between June 21 and July 18, ran to 495 numbers from elevations of 5,700–8,000 feet.

The mountain consists of a massive block of syenite, about twelve miles by twelve, rising precipitously from a flattish plain, and constricted at the middle to form eastern and western lobes of approximately equal area. As seen from the north and west, upthrust basal scarps end in a discontinuous though very conspicuous line at about 6,000 feet, where they form the outer rim of a number of platforms or uplands, of which there are several of various width and size on both lobes of the mountain. On both lobes the massif culminates in a craggy main ridge, rising behind the uplands. Crowning Mlanje Peak, 9,843 feet in altitude, is situated on a narrow neck between the lobes of the mountain. Several other peaks, on the main ridge and in peripheral positions, attain heights of 8,000 and 9,000 feet. To the north, a deep notch called Fort Lister Gap separates 6,500-foot Mchesa Peak from the main mass of Mlanje.

Tea is planted extensively at altitudes up to about 3,500 feet on the south and southwestern foothill slopes. The upper parts of the mountain have been made a forest reserve for the preservation, controlled cutting, and planting of *Widdringtonia whytei* (Mlanje cypress or cedar), a valuable timber tree found only on Mlanje and on Chirinda Mountain in Southern Rhodesia. The logs are pit-sawn in the forests and the lumber carried down steep paths to Likubula, and another depot in Fort Lister Gap, by native porters. Paths on the mountain connect the principal uplands of the eastern and western lobes. On Luchenya (or Lichenya) Plateau, the largest western upland, there were several cottages, built by Europeans for vacation use in the hot season, besides the forester's cottage and ancillary buildings which we used while on the mountain. Our field work was confined to this upland, a smaller western upland called Chambe Plateau, and adjacent slopes including the main central ridge. We were unable to visit the eastern lobe of the mountain, from which, as far as could be ascertained, very few plants had been taken by earlier collectors.

Dire predictions were made by old residents of the country as to the foul weather we could expect on Mlanje in the winter months of June and July, and after our experience on Zomba, we went prepared for the worst. Extra clothing and blankets were bought for our natives, and peanut oil, tea, and sugar were added to their regular rations of mealie meal, beans, and dried fish. But between early mornings and evenings usually misty, 11 of the 24 days we spent on the mountain were clear and fine; eight were grey days made more or less uncomfortable by mist and drizzle; and only five brought really bad chiperoni weather with continuous mist and rain driven by a cold south to southeast wind. Frosts whitened the ground on five clear mornings, when ice crystals on shady wet ground remained unmelted until eight or nine o'clock. No snow was observed, although occasional heavy falls have been reported to occur on the heights—in 1918 and 1926, for example. Maximum shade temperature on our cottage veranda, at about 6,100 feet, ranged from 50° to 56°, minimum from 37° to 45° F. Annual rainfall on Luchenya Plateau is about 110 inches.

On our route up the mountainside from Likubula base, *Brachystegia*-type woodlands occupied the slopes up to 5,000 feet and scattered trees of the community persisted to 5,600 feet. Montane rain forest descended in gullies to 4,600 feet, in sparse brushy growths in which appeared the first small *Widdringtonia* trees. With increasing altitude, *Widdringtonia* became a prominent overtopping tree in forests in the shelter of gullies and under bluffs. At about 5,800 feet a great change took place in the open vegetation of the slopes. The tall, coarse grasses of the lower levels gave place to a denser growth of softer, knee-high grasses at what appeared to be the lower edge of the zone of frequent mists on that part of the mountain. Two small ericaceous trees, *Agauria salicifolia* and *Philippia benguelensis,* characteristic of montane forest second growths, suggested a fire-induced origin for this tree and grass community. From about this altitude upward, on the broad uplands and the slopes above them to 6,500 feet and more, fires obviously had been at work. The mountain presented a patched pattern of dark closed forest, in a setting of uplands and slopes predominantly grassy and treeless. Most of the surviving forest occurred in ravines, hollows, and other situations sheltered from the full force of the southeast wind of the dry season and thus in a measure protected from fire. What little forest there was about 7,000 feet consisted of diminishing gully strips which soon petered out altogether, or, where rugged rocky terrain afforded shelter, persisted in elfin-wood form to slightly over 8,000 feet. A shrub form of the *Widdringtonia* occurred on these high rocky slopes. As seen through glasses, the highest parts of the mountain consisted of masses of grey rock, smoothed by erosion and patched with saxicolous lichens, or rough and fissured and supporting a meager scattering of shrubs and tufts of grass or Cyperaceae.

Whyte in 1891 (as reported by Carruthers in Britten et al.) described Luchenya Plateau much as we saw it 55 years later. Then, as in 1946, the largest body of forest survived in the damp gorge of the Luchenya River, which drains the plateau in a southeasterly direction, and most of the other forest relics were in gullies and ravines of tributary streams. Whyte deplored the devastating effects of the annual bushfires, which crept up to the plateau from the inhabited lower slopes of the mountain in the dry months of August and September. The plateau grasslands had been recently burned at the time of his visit. He described the annual attrition by fire of the remaining belts of forest. "In exceptionally dry seasons it appears that these fires have even penetrated some of the damp forests, and hundreds of giant cypresses lay prostrate and piled on each other in all stages of destruction, but generally burned right through at the base of the tree." From Cholo late in September we watched a fire advance up the slopes of Mlanje and in several days reach nearly to the rim of Luchenya Plateau, where it died out. For 20 years or more every effort had been made to protect the remaining forests, and only very minor recent fire damage was noted at the time of our visit.

The *Widdringtonia* is the outstanding tree of the mountain, and is approached in size only by *Podocarpus milanjianus* Rendle, a less common conifer of the forests. Old trees may be over 100 feet tall and their straight trunks, coated with very thick fibrous bark, attain six feet in diameter at the base. It may dominate the forest in pure stands on the sides of ravines and other steep slopes, or occur in more open order as a conspicuous super-canopy tree thrusting grey boles and lichen-draped crowns well above a mixed stand of broadleaved trees that forms the actual canopy of most of the forest. The broadleaved trees, thick of stem in proportion to their height of 30 to 60 feet, formed a canopy so dense that on dull days visibility under it was too poor for details in the treetops to be made out or for one to see more than a short distance in the forest. The few species found in flower or fruit included *Pygeum* 16611, *Allophyllus* aff. *buchananii* Gilg, *Olina usambarensis* Gilg, 16614, 16609, *Myrica* 16613, and, usually in marginal situations, *Royena whyteana* Hiern, *Maesa* cf. *lanceolata* Forsk., *Lachnopylis* cf. *goetzeana* (Gilg) Greenw., and *Rapanea melanophleos* (L.) Mez. Some of the marginal trees were perhaps second growth elements, grown big. For example, massive old *Agauria salicifolia* trees occurred in forest edges both here and on Zomba, but on Mlanje and Nyika this was also a characteristic species of secondary forest and secondary savanna.

In an abundance of bryophytes, prominent throughout and normally saturated and cold from mist and rain, heavily padded on marginal trees, cushioned in treetops, and in the moister ravines enveloping tree trunks and combining with matted surface roots to form a springy and often treacherous ground cover, these were typical cloud forests. Associated with the mosses and hepatics as epiphytes were many orchids and ferns of rather few species, the former all sterile in June and July, the latter most commonly *Asplenium aethiopicum* (Burm.) Bech., *A. sandersonii* Hook. f., *A. megalura* Hieron., a *Vittaria, Polypodium excavatum* Bory, *Loxogramme lanceolata* (Sw.) Pr., shrubby *Oleandra africana* R. Bonap., and the massed filmy ferns *Hymenophyllum kuhnii* C. Chr., *H. capillare* Desv., and *H. polyanthos* Sw. Yellow-flowered *Senecio milanjianus* S. Moore, pendent *Streptocarpus goetzei* Engl., and *Lycopodium ophioglossoides* Lam. were striking though less common epiphytes. Without determinations for collected plants, about all that can be said of a floristically poor undergrowth under unbroken canopy in the primary forest is that it was predominantly herbaceous, and *Plectranthus swynnertonii* S. Moore, 4–6 feet high, was a characterizing species.

The undergrowth in some forest patches in upland hollows consisted mainly of a fleshy plant of the Acanthaceae (?), growing to 8 feet or more where undisturbed, but in most of the forest the bushbuck had it cropped down to less than half that height. A remarkable thing, this browsing by bushbuck. The bitten-off undergrowth sent out side shoots which in turn were cropped back. The result was a stand as even, as dense, and as severely trimmed as a well kept tea plantation, with thick mossy tree trunks rising out of it—all in the heavy shade of the forest canopy.

Moist openings in the forest had their own complement of light-requiring plants, most of them also found on banks of forest streams, for example, the scrambling herbs *Caucalis incognita* Norman and *Hypoëstes triflora* (Forsk.) Roem. & Schult., the grasses *Panicum monticola* Hook. f. and **Eragrostis phaeantha* C. E. Hubb., and pinkish-flowered *Impatiens shirensis* Bak. f. growing 6 feet tall. Down in the Luchenya Gorge, the streamside trees were shaggy with mosses and crowded with ferns. The yellowish culms of a bamboo (*Arundinaria alpina* K. Schum.) arched out over the water, and an opulence that only tree-ferns can give was contributed by an abundance of *Cyathea* 16675, thick stemmed and up to 25 feet tall, and smaller *C.* 16600.

On short acquaintance, the forest regenerative growths developed after disturbance, as by fire and landslips, were not readily separable as a community from border shrubberies which formed a narrow ecotone between primary forest and grassland. Both communities made very dense growths which screened the forest interior from wind, filtered out light, and no doubt played an important part in protecting the forest from grassfires. Taken together, they contained many colorful plants in a rich assemblage of species. Among common shrubs or small trees were *Agauria salicifolia, Philippia benguelensis, P. nyassana* Alm & Fries, *Erica johnstoniana* Britt. and other Ericaceae; *Vaccinium africanum* Britt., *Hypericum lanceolatum* Lam., *Cliffortia nitidula* (Engl.) R. E. & Th. Fries, *Anthospermum welwitschii* Hiern, *Coreopsis pinnatipartita* O. Hoffm., *Halleria elliptica* Thunb., *Buddleja salviifolia* Lam., and *Dissotis johnstoniana* Bak. f.; and in the Luguminosae, showy yellow-flowered *Aeschynomene megalophylla* Harms and *Smithia scaberrima* Taub., and purple-flowered *Tephrosia whyteana* Bak. f. Plentiful as scrambling plants were *Rubus ellipticus* Sm. and herbaceous *Cineraria buchananii* S. Moore.

The grasslands comprised two major communities, one occupying deforested areas, the other generally at higher levels on the mountain and apparently a primary condition. The rolling treeless ridges of Luchenya Plateau, perhaps 10 square miles in area, offered a good example of the first type. The soil was generally a shallow loam underlain by reddish bauxitic clay. When exposed, as on paths, the bauxite ore formed clinker-like bodies that crunched under one's feet and were hard on boots. With the exception of *Loudetia simplex* (Nees) C. E. Hubb., the predominant species, and *Exotheca abyssinica* (Hochst. ex H. Rich.) Anderss., the few grasses of a bunched, rather dense cover, about 18 inches high, were past seeding. Colonization from the lower mountain slopes was indicated by the *Loudetia* and the *Exotheca,* grasses of the *Brachystegia* woodlands. There were no true grassland shrubs, and apart from several *Gladiolus* species, in seed, about the only native herbs in evidence were showy yellow-flowered *Helichrysum buchanani* Engl., *H. nitens* Oliv. & Hiern, and *H. lastii* Engl. Foxgloves *(Digitalis),* originally planted along paths, apparently had become naturalized.

The grasslands regarded as primary lay chiefly above 6,500 feet, at levels frequently shrouded in mist when the lower levels were clear. They were dominated by one or more coarse tussock-forming species, sterile when we saw them. Much of the tussock-grass country is rocky and craggy and broken by bare rock slopes often wet with seepage water. Hollows contain a black organic soil, springy to walk on, and, where deeply deposited, often cut by narrow erosion gutters, hidden by the grass, which may go down four or five feet to the underlying rock. Outliers of the community are met with on the lowest parts of the uplands, in rocky situations on the *Loudetia* grasslands, on the banks of streams, and in boggy bottoms. Clumped sedges such as *Costularia natalensis* C. B. Clarke and *Coleochloa oliveri* (Boeck.) Gilly tend to replace the grasses on shallow stony soil. *Coleochloa ? virgata* K. Schum. sometimes forms extraordinary tussocks, several feet high, with fibrous peaty base shaped into vase-like forms. These grasslands carry a number of shrubs including *Lopholaena whyteana* (Britt.) Phill. & C. A. Sm., *Helichrysum densiflorum* Oliv., *Selago thomsoni* Rolfe, *Hebenstretia dentata* L., and the small heaths *Blaeria kiwuënsis* Engl. and *Erica milanjiana* Bolus. The community occupied more varied terrain than any other high grassland we saw in Nyasaland and was by far the richest in herbs. To mention only a few, *Xyris* species grew in bogs; utricularias on seepage slopes, *Knowltonia transvaalensis* Szyszyl. under bracken and flowering after fire; *Geranium latistipulatum* Hochst., *Micromeria biflora* (Buch.-Ham.) Bth., and a new *Stachys* (16792) in shelter of rocks. Most conspicuous on open ground were the helichrysums mentioned for the *Loudetia* grasslands, also *H. kirkii* Oliv. & Hiern and *H. odoratissimum* (L.) Less. Of so-called "bulbous" species, dormant plants were found, but only a *Kniphofia* and a *Dierama* in flower. Ground orchids were said to be a striking feature of the grasslands later in the year.

As in all habitat groups on Mlanje, more species of xeric rock-inhabiting plants were seen than could be collected in identifiable condition. Very abundant locally and of small-tree stature were *Aloe* 16525 and *Vellozia splendens* Rendle, the latter not flowering. *Anthospermum whyteanum* Britt. was a common shrub; *Crassula globularioides* Britt., *Helichrysum sordidum* S. Moore, and *Streptocarpus hirtinervis* C. B. Cl., common herbs; *Plectranthus sanguineus* Britt. and *S. crassus* N. E. Br., succulent sub-shrubs. Most attractive of all the rock plants was shrubby *Helichrysum whyteanum* Britt., with beautiful silvery-white flowerheads delicately flushed with pink.

Nchisi and vicinity. The government bungalow in which we had our headquarters at Nchisi stood at an altitude of about 4,600 feet on the edge of the western escarpment of the Rift, and on the lower southeastern slopes of Nchisi Mountain. Below it, ridgy slopes dropped rather steeply to the plains of Lake Nyasa, 3,000 feet below. Twenty miles away, straight into the sunrise, was the lake, a great body of water with mountains in Portuguese territory showing dimly on its far side, and high Mbenge Island lying off its western shore. Nchisi Mountain rose directly from the edge of the Rift as a steep narrow ridge, and its summit, about a mile from camp, had an altitude of about 5,400 feet.

Lying partly behind the mountain and extending southward along the edge of the Rift at elevations of 4,500 to 5,000 feet, were the Chintembwe-Mweru plateau highlands, densely populated by people of the Chewa tribe. In its nearer parts this was a fertile country of rolling bald hills of deep reddish soils derived from graphitic schists, evidently deforested, and carrying patches of dark green apparently secondary closed forest which, according to Willan (1940, p. 53) is a deciduous type comprised of *Albizzia maranguensis* or a mixture of this tree and *Cordia abyssinica.* A numerous native population also inhabited parts of the slopes of the escarpment down to an elevation of about 3,000 feet below Nchisi Mountain. It seemed probable that much of the land occupied and cultivated by these people formerly carried a dry deciduous forest or dense woodland shown on Willan's vegetation map as *Pterocarpus-Bauhinia* Foothills Forest. Jungly second growths of tall grass and small trees covered lands not actually under cultivation

Between altitudes of about 4,000 and 3,500 feet on the slopes was a great deal of bamboo *(Oxytenanthera abyssinica),* averaging about 30 feet in height, which seemed to have come in after the destruction of the original vegetation.

A patch of tall rain forest, perhaps a square mile in area, occupied the eastern slopes of Nchisi Mountain from about the 5,000-foot level to the crest of the summit ridge. Elsewhere on the relatively moist eastern slopes, and covering all the drier western side of the mountain except for one rain-forested gully, were *Brachystegia* woodlands. In earlier times, when raiding Angoni impis struck into this area, the local Chewa people took refuge on the mountain. Taking their cattle with them, they fled into the rain forest, where, for fear of evil spirits, the Angoni would not follow them. The word nchisi is said to mean fortress in the Chewa language.

In the rain forest of the mountain several species of trees including, among those collected, *Chrysophyllum fulvum* S. Moore, *Pygeum africanum* Hook. f., *Lachnopylis viscosa* (Gibbs) C. A. Sm., *Syzygium guineense* (Willd.) DC., and *Rauvolfia caffra* Sond., attained large size. Magnificent trees of *Piptadenia buchananii* Bak., well over 100 feet tall and with boles at least six feet in diameter, dominated the forest locally. But in all its strata, from canopy layer to floor plants, the forest was poor in species. There were no enriching palms or tree-ferns, few lianas, and only a sparse epiphytic flora of mosses and such ferns as *Asplenium sandersonii* Hook. and *A. mannii* Hook. Under a predominantly woody undergrowth, usually tall and easy to walk through, *Oplismenus compositus* (L.) Beauv. and the ferns *Tectaria gemmifera* (Fée) Alston and *Pteris quadriaurita* Retz were fairly common ground plants. In moist gullies *Rhinacanthus nasutus* (L.) Kurz and other Acanthaceae occurred with a richer and more abundant representation of ferns including *Dryopteris* spp., *Asplenium inaequilaterale* Willd., *Didymochlaena truncatula* (Desv.) C. Chr., and large *Marattia salicifolia* Schrad.

Protection to the edges of the rain forest from dry-season fires burning in adjoining woodlands was provided by an ecotone of sappy shrubs and tall herbs generally some yards in width, and in only one place was this seen to have been ineffective to the extent that a fire had burned to the edge of the forest proper and done some damage by scorching marginal small trees. Many constituents of the border community such as *Dombeya* aff. *platypoda* K. Schum., *Iboza riparia* (Hochst.) N. E. Br. with showy white or lavender panicles, *Abutilon longicuspe* Hochst., *Hypoëstes verticillaris* (L. f.) R. Br., *Ocimum suave* Willd., and scrambling *Cyathula cylindrica* Moq. were also met with in the edges of gallery strips of rain forest in moist to half-swampy gullies in the dry *Brachystegia* woodlands. *Syzygium cordatum* Hochst. was the chief tree of these gallery forests, *Anthocleista zambesiaca* Baker with pale leaves up to two feet long, the most striking. Most unexpectedly, in the absence of tree-ferns from the main forest of the mountain, stout-stemmed *Cyathea* 17102 was found in one of the wetter gallery forests.

Brachystegia spiciformis Benth., the principal tree of the woodlands, had crooked, lichenous, and often orchid-cluttered branches forming a flattish to very flat crown. In hollows and gullies the tallest trees were about 40 feet high, and *Hyparrhenia gazensis* (Rendle) Stapf and *H. bracteata* (Humb. et Bonpl.) Stapf characterized a dense body of grass 3 to 9 feet tall. On the dry crests of ridges the trees were so low that one had to stoop to see under them and over a rather thin grass cover in which *Themeda triandra* Forsk. var. *hispida* Stapf supplied most of the stocking. Associated trees included *Faurea* 17132, *Monotes africanus* A. DC., and in local abundance *Isoberlinia paniculata* (Benth.) Hutch. and *Uapaca kirkiana* Muell. Arg. Leguminous *Droogmansia whytei* Schindl., *Aeschynomene nyikensis* Bak., and *Eriosema affine* De Wild. were common shrubs.

Among conspicuous late flowering tall herbs, largely Compositae, were *Laggera alata* (D. Don) Sch. Bip., *Schistostephium artemisiifolium* Bak., *Helichrysum kirkii* Oliv. & Hiern, *Polygala gomesiana* Welw., and *Acrocephalus callianthus* Briq. On a field estimate, about one-third of the herbs were of species that also occurred on the lower plateau of Zomba Mountain on the eastern side of the Rift.

When we began our first stay at Nchisi, late in July, the annual burning of the grass had already begun, and distant views were obscured by haze after early morning. The grassfires were chiefly at lower elevations, down in the Rift, but patches had been burned in drier parts of the woodlands at Nchisi. We had been told that no rain fell in this area between April and mid-December. On July 29, however, chiperoni conditions prevailed, with mist down to the ground most of the day, and some light rain. Again, on September 12, a smart fall of rain yielded perhaps half an inch. Such off-season rains and mists perhaps made possible the development of the tall rain forest on the mountain.

As the dry season advanced and spring gave way to climatic summer, it became evident that the growth and reproduction cycle of many plants of the woodlands was influenced more by such factors as temperature and length of day than by rain and available ground moisture. This was especially evident in the deciduous *Brachystegia* and *Isoberlinia* trees, which broke out into new leaf during the first week of September, and with the bright reds and coppery browns of their young foliage transformed the countryside. Flower buds appeared with the new leafage but did not open before we finally left the area on September 13. The leafing out of the *Brachystegia* trees is considered to mark the beginning of summer in these latitudes in East Africa.

Grass-fires had important effects upon the woodland vegetation apart from actual burning. They hastened leaf-fall in the deciduous trees and this resulted in an earlier showing of young leaves. Soon after the grasses had been burned they sent up young shoots from amongst the blackened stubble. With the young grass growths appeared the showy flowers of numerous perennial herbs, while on adjoining ground that escaped the fire there was not a sign of new growth. Common herbs or subshrubs thus flowering in the neighborhood of Nchisi in early September, 4 to 6 weeks after fires, included *Gnidia buchanani* Gilg, *Lasiosiphon kraussianus* (Meisn.) Burtt Davy, *Crepis newii* Oliv. & Hiern, *Berkheya insignis* (Harv.) Thell., *Caucalis pedunculata* Bak. f., *Osteospermum monocephalum* (Oliv. & Hiern) Norlindh., *Lotononis laxa* Eckl. & Zeyh. var. *multiflora* Dümmer, and *Rhynchosia insignis* (O. Hoffm.) R. E. Fries. Some of these species, though in full flower, had not yet produced leafy shoots from their deep taproots or woody or fleshy rootstocks.

The plant collections of the expedition from Nchisi and vicinity totalled 306 numbers.

Nyika Plateau. Rising from the western edge of the Rift, steep-sided on all fronts, the Nyika Plateau is about 40 miles across in its widest part and approximately 900 square miles in area. For the most part it is a great upland of smooth grassy ridges with an average elevation of 7,000 to 7,500 feet. Eminences attain often 8,000 feet, and on the eastern rim as much as 8,400 feet. The Nyika uplands are the most lofty in Nyasaland. On them a small population, known as the Apoka, lives at altitudes higher than any other people in the country. Well armed with bows and spears, the shy Apoka descend from the plateau with big balls of cured tobacco and gourds of honey for trade. If cattle or other domestic animals were grazed on the plateau, I saw no signs of them. Zebra and eland were fairly plentiful.

The plateau is seldom visited by Europeans, although the time is perhaps not far distant when, with the development of incentive, its large area of vacant, fertile-appearing lands, and undoubtedly healthy climate, will attract settlement by white farmers. Successful experimental plantings of pyrethrum were made on the plateau during the Second World War. Biological investigations appear to have been concerned chiefly with birds, which were collected as early as 1896 by Alexander Whyte, who also collected plants. The flora is little known.

My approach to Nyika was from Nchena-chena Agricultural Experiment Station, at about 4,200 feet on the southeastern uplift to the plateau. The station was beautifully situated with a view over orderly, irrigated plantings and across the trough-like South Rukuru Valley (generally called Henga Valley) to the north end of the 6,000-foot Vipya Plateau, about 10 miles away. Water for the plantings was gravitated from one of the many perennial streams with source on the plateau. Arabian coffee, tung of the *montana* species, and Garner wheat were being demonstrated for native interest as commercial crops. Thriving native plantings of coffee were already established somewhat higher on the slopes.

A steady climb, by a well-worn path leading up Nchena-chena spur ridge, was steepest at the beginning and under the rim of the plateau. *Brachystegia* woodlands reached up the slopes to about 5,300 feet. Above this was a tract evidently denuded of woodland for former native cultivation, in which on the open spur crest scattered small *Protea* and *Philippia* trees grew in grass four to six feet high, while the slopes below were covered with bracken. Flowering in the grass was blue *Delphinium dasycaulon* Fresen., yellow *Helichrysum kirkii* Oliv. & Hiern, and tall *Polygala gomesiana* Welw. Plentiful as shrubs were *Eriosema ellipticum* Welw. ex Bak., *E. montanum* Bak. f. and *Tephrosia aequilata* Bak. At about 6,500 feet the small trees practically disappeared, the grass was now only a foot high, and a different set of smaller showy herbs, among them white *Geranium vagans* Bak. and orange-red *Aloe* 17147, were in flower. The path passed through a belt of montane forest covering the crest of the spur at 6,900 feet. Dark forest, tailing off in narrow strips far down the streams, filled the upper ends of the ravines and ended abruptly at, or a little below, the edge of the plateau.

The top of the escarpment was reached at about 7,600 feet, in 2½ hours at carrier pace from Nchena-chena. After another half hour of travel over rolling, quite treeless grasslands of the plateau, camp was established at a couple of rather dilapidated and damp grass-thatched huts built by the pyrethrum growers. This was at an altitude of about 7,700 feet, beside some relic scraps of forest on the edge of a boggy bottom, and about half a mile from the forests under the edge of the escarpment. My only extensive views of the plateau were had on this day and the day following (August 11). From then until my return to Nchena-chena on August 20, field work was carried out in almost continuous mist and cold drizzle which limited visibility to a few yards. Casual thermometer readings outside my tent at night gave lows of 36° and 37° F. Daytime highs ranged from 50° to 54° F., with one reading of 62 degrees during a brief burst of afternoon sunshine. According to local information, a fortnight of bad weather can be expected on Nyika in each of the months June, July and August.

The appearance of the Nyika grasslands, and the presence of numbers of small relic patches of forest, strongly suggest that with the exception of wet or boggy hollows and streamways, and perhaps some rocky hills, the parts of the plateau that I saw were at one time covered with montane forest. Probably the process of deforestation was much the same as on Mlanje, with in this case the Apoka playing a part by clearing land for cultivation and enlarging by dry season burning the grasslands thus established. The present Apoka of the plateau are the descendants of a remaining group of a much larger population which in the 19th century was driven onto the high country by the marauding Angoni and settled there for a time.

The prevailing grasses of the plateau had shed their seeds and were not in condition to collect at the time of my visit. Recognizable, however, as the most important species, was *Exotheca abyssinica* (Hochst. ex A. Rich.) Anderss., also the dominant grass of the escarpment above Nchena-chena. A good representation of shrubs and herbs occurred near forest borders, but such plants on the great open grasslands were remarkably though not unexpectedly few in species, and migration mainly from lower altitudes seemed indicated. The commoner herbs included **Helichrysum* 17218, *H. fruticosum* (Forsk.) Vatke, *H. kirkii, Osteospermum monocephalum* (Oliv. & Hiern) Norlindh., *Gerbera abyssinica* Sch. Bip., *Caucalis pedunculata* Bak. f., *Lotus* aff. *oehleri* Harms, *Swertia johnsoni* N. E. Br., *Sebaea grandiflora* Schinz, and *Buchnera crassifolia* Engl. Shrubs included the very small heaths *Blaeria patula* (Engl.) Engl. and *B. kiwuensis* Engl., *Anthospermum usambarense* K. Schum., *Protea kingaensis* Engl., and *Selago thomsoni* Rolfe. The grassy bogs were often edged with bracken [*Pteridium aquilinum* (L.) Kuhn] killed back as if by frost, and in them *Blechnum tabulare* (Thbg.) Kuhn, of almost tree-fern stature, grew in abundance. Also inhabiting bogs was a smallish species of the giant mountain lobelias *(L. ? mildbraedtii* Engl.) growing higher than a man but, unfortunately, past flowering.

The primary montane forest survived in greatest bulk on steep slopes close below the rim of the plateau. Isolated relic patches occurred on some plateau hilltops near the edge of the escarpment. Under presumably drier or less misty conditions farther back on the plateau, the forest relics were in hollows which afforded a certain amount of protection from winds which would intensify the impact of grassfires. The most distant relic examined was a patch of a few acres dominated by *Juniperus procera* Hochst., four hours walking distance westerly from camp, at an altitude of about 7,200 feet in the valley of the Uyaghaya stream. Here at the southernmost known limit of its range, the juniper attained a height of 100 feet or more and a trunk diameter of 4 or 5 feet. The Forestry Department maintained a firebreak around the fragment of undisturbed forest and nearby clumps and scattered trees of the species, left by fires, and saved from destruction by Mission timbercutters who had come to this remote place to pitsaw the trees for their fragrant, cedar-like wood.

Junipers were not seen elsewhere on the plateau. In the primary forests under the plateau rim, *Podocarpus milanjianus* Rendle provided a plentiful coniferous element, and *Hagenia abyssinica* (Bruce) J. F. Gmel., *Macaranga* 17294, *Kiggelaria africana* L., and *Royena whyteana* Hiern were other common components. About 25 to 50 feet tall, these forests were plentifully mossed. Undergrowth was predominantly woody; sparse under dense shade, abundant under broken canopy and there even luxuriant with the entry of shrubs such as *Piper capense* L. f. and *Plectranthus albo-violaceus* Gürke, and the tree-fern *Cyathea* 17209. A sparse flora of vascular epiphytes included *Peperomia retusa* (L. f.) A. Dietr., *P. goetzeana* Engl., *Schefflera polysciadia* Harms as a large shrub, and among ferns *Adiantum poiretii* Wikstr. and *Hymenophyllum* 17260.

A limited amount of forest regeneration was taking place on the plateau. Three species of small trees, *Philippia benguelensis* (Engl.) Welw., *Myrica* 17221, and *Agauria salicifolia* (Comm.) Hook. f., formed patches of more or less open second growth forest or grew scattered in a sort of open woodland. These developments were usually in the more sheltered hollows. In the aggregate they much exceeded the area of primary forest.

Plant collections from upper parts of the escarpment and the plateau of Nyika amounted to 215 numbers.

Kasungu. Kasungu is at an altitude of about 3,400 feet on the western plateau highlands, approximately midway between Lake Nyasa and the Northern Rhodesian border, and about 16 miles north of the permanently flowing Bua River on the North Road. A government station and trading center are surrounded by numerous native villages on a tract of fertile red lands, some square miles in area, around which the soils are generally grey and sandy and covered with monotonous woodlands of the *Brachystegia* type. About 1½ miles to the west, rocky, granitic Kasungu Hill rises about 1,000 feet above the plain.

This was chiefly a mammal collecting locality for our party. Conditions were too dry for profitable botanical collecting when I spent five days there late in August, and most of the country had recently been burned. Clearing and cultivation had greatly altered the original vegetation. The area of better soils had perhaps been occupied by *Brachystegia-Combretum-Acacia* woodland. Shady *Combretum mechowianum* O. Hoffm., *Kigelia pinnata* (Jacq.) DC., and *Parinari mbola* Oliv. trees, about the villages, seemed to be relics of the original vegetation on the superior soils.

The existing woodlands appeared in large part to be second growths on lands less productive to the natives, but formerly cultivated. On stiff soils of stream flats a deciduous *Acacia,* leafless when I saw it, grew gregariously in stands about 50 feet high. Elsewhere, in stands of mixed composition, 15 to 30 feet high, *Brachystegia boehmii* Taub. was the principal tree in association with *Isoberlinia paniculata* (Benth.) Hutch., *Terminalia sericea* Burch., *Diplorrhynchus condylocarpon* (Muell. Arg.) Pichon, *Combretum zeyheri* Sond., and lesser species including four of *Strychnos* (*S. pungens* Solerad., *S. schumanniana* Gilg, *S. innocua* Del., *S.* cf. *lokua* A. Rich.). The bunched grass cover on unburned ground was 4–8 feet tall and occupied less than 50 per cent of the soil surface. Apart from a few green shoots of grass springing from the burnt ground, the yellow flower clusters of leafless *Cassia singueana* Del., the yellow flowerheads of ubiquitous *Helichrysum kirkii* Oliv. et Hiern, and the white of *Vernonia amygdalina* Del., provided about the only touches of fresh color in the whole dreary landscape.

Rain forest elements formed brushy growths of small trees, and scrambling shrubs such as *Jasminum fluminense* Vell. and *Canthium zanzibaricum* Klotz., narrowly edging the banks of dry streams in the woodlands. On the rockier parts of Kasungu Hill a dry, partially deciduous brush of low trees and tall shrubs contained **Rhus* 17451, *Heeria reticulata* (Bak. f.) Engl., *Boscia corymbosa* Gilg, *Vernonia polyura* O. Hoffm., *Ficus sonderi* Miq., and, most conspicuously, an arborescent columnar *Euphorbia* resembling *E. ingens.*

Searching in this locality for identifiable plants yielded only 58 numbers, about 50 per cent of which were in flower and the rest in fruit.

Chia. The Chia is defined geographically as the lake plains part of the drainage area of five small rivers, the Lifuliza, heading on Nchisi Mountain, the Matamango, Likoa, Luwi, and Mambara, which in the rainy season empty their waters into Chia Lagoon, a quiet western bay of Lake Nyasa some few miles south of Kota-kota, or into the lake between the lagoon and the Chia River. The papyrus and reed-fringed lagoon is an important fishing place in the southeast season, when the waters of the open lake often become too rough for the crude, clumsy dugout canoes of the native fishermen.

From Nchisi the Chia area was reached by a narrow road winding down the escarpment of the Rift, then over uninhabited foothills to near Benga village on the lakeshore, where the road turned north on the lake plains and in about eight miles came to Chibotela village, beside which our party was camped when I rejoined them on August 31. Chibotela was about three miles inland from the lake and eight miles south of Chia Lagoon. A stream which flowed by the camp site in the wet season was dry except for a string of yellowish waterholes, some shaded by thin lines of rain forest trees, others open to the hot sun and dotted with blue waterlilies *(Nymphaea caerulea* Savigny). The lake plains, covered as were the foothills with dry woodlands, had a general elevation of about 1,575 feet above sea level. Casual shade temperature readings for the camp gave morning lows of 53° to 55° and maxima of 88° to 92° F.

Chibotela camp was shaded by spreading woodland trees, and pervaded by the sweetish smell of blood and fresh meat. This was big game country. The bag of our party included buffalo, rhino, lion, leopard, zebra, wart-hog, and among the larger antelope, hartebeeste, reedbuck, and waterbuck. Large animals destructive to the mealie, cotton, and rice crops of the villagers were so numerous that native hunters were employed by government to abate the nuisance. Hippos were said to do much damage along the lakeshores. And as in most parts of Nyasaland where crops were grown, thieving baboons were a costly pest. A heavy infestation of tsetse fly apparently was not accompanied by much sleeping sickness.

In the neighborhood of Chibotela, the gently sloping, slightly ridgy lake plains had generally sandy soils on which the larger trees of the open woodland, 40 to 60 feet tall, included *Brachystegia utilis* Hutch. & Burtt Davy, *Isoberlinia globifera* (Benth.) Hutch., *Afrormosia angolensis* (Bak.) Harms, *Parinari mbola* Oliv., and *Swartzia madagascariensis* Desv. *Uapaca kirkiana* Muell. Arg., found almost everywhere in Nyasaland on sandy woodland soils, was less common than *U. sansibarica* Pax. Among smaller trees were *Hirtella bangweolensis* (R. E. Fries) Greenw., *Dalbergia nitidula* Welw. ex Bak., *Strychnos* species, and *Hexalobus monopetalus* (A. Rich.) Engl. Deciduous and leafless *Stereospermum knuthianum* Cham., the "pink jacaranda" of some European residents of the Protectorate, made a fine showing on the floodbanks of streams, where *Eriosema englerianum* Harms, *Adenodolichos punctatus* (Micheli) Harms, and *Flemingia grahamiana* Wight & Arn. were common shrubs. New leaf colors gave reddish, brownish, and yellowish tinges to the trees on recently burned areas. Earlier burning of most of the country had produced an abundance of short green grass for the game animals, especially on the sandier soils and in moist depressions called dambas, but few herbs had sent up flowering shoots after the fires.

There were dambas of various kinds, ranging from well-wooded slight hollows of stiff soil to treeless expanses containing marshes and waterholes. In one large open damba, about a mile east of camp, a great many blue and lilac waterlilies, and a few white ones, were flowering in an area of open water bordered by tall beds of papyrus and reeds. Small herbs on moist edges of the marsh included *Xyris* 17474, *Burmannia* 17473, *Polygala capillaris* E. Mey., and *Alectra rigida* (Hiern) Hemsl.

Rain forest elements, represented in bits of gallery woods fringing streams and in clumps of brushy forest on the banks of waterholes away from streams, included *Chrysophyllum argyrophyllum* Hiern, *Garcinia huillensis* Welw. and *Trichilia emetica* Vahl as trees, *Canthium zanzibaricum* Klotz. and *Landolphia kirkii* Dyer as subscandent shrubs, and the large vine *Capparis tomentosa* Lam.

Termite mounds on the dry woodlands, usually about 6–10 feet high and 20 feet or more across the base in this area, carried a distinctive but limited flora of shrubs and trees, and frequently a species of *Sansevieria* and the vine *Cocculus hirsutus* (L.) Diels. The trees were all sterile and most of them leafless. Among the commoner large shrubs were *Cadaba kirkii* Oliv., *Combretum mossambicense* (Klotz.) Engl., and *Phyllanthus* 17563.

In seven days, 106 numbers of plants in flower or fruit were collected in the Chia and on the lakeshores at Benga. For dry season collecting this was considered fairly satisfactory.

Cholo Mountain. Situated on the eastern brink of the Rift, 35 miles west of Mlanje Mountain, Cholo Mountain had the form of an elongated ridge somewhat over 4,600 feet in maximum elevation. On its upper parts, in a belt 4 or 5 miles long and perhaps a mile wide, the mountain carried one of the largest of the scattered tracts of rain forest in the Protectorate. The western side of the mountain dropped very steeply into the Rift Valley. Below the rain forests on the more moderate eastern slopes, and on the southern extension of the Shire Highlands at the foot of the mountain, were numerous native villages and some large tea plantations. Protruding above the forest on an eastern spur of the main ridge was a "rainmaker's rock," a monolith of syenite or some other granitic rock which the natives called Cholo, the name now applied to the whole mountain and the adjacent district.

We were able to drive our truck to the edge of the rain forest on the southern end of the mountain, where we camped at about 4,000 feet, near native gardens and several small villages. More or less cloudy though fine weather prevailed through most of our stay from September 18 to 30. Sharp showers, and mist down to the ground, were experienced for a few hours on the morning of the 19th. The first thunderstorm rain of the season occurred during the afternoon of the 24th. During the night before and the night after this event, our tents were invaded by myriads of black ants on migration. The ants overran beds, boxes and tables, but the ridges of the tents were found to be a safe retreat by the many spiders and crickets which shared our quarters with us.

Although developed under presumably wetter and more uniform climatic conditions, and somewhat more luxuriant, and richer in species, the rain forests of Cholo Mountain had much in common with those of Nchisi. Here, however, there had been recent encroachment by natives clearing land for cultivation, and extensive developments of second growths bordered the primary forest on the slopes. Here and there in the depths of the forest one found spring snares and deadfalls set by the natives to catch mammals for meat, but there were no well-defined paths. Such paths as there were began and ended nowhere in particular. The village natives showed reluctance to go into the forest with us. They professed to be afraid. Someone had spread the word that we were there for no good purpose. In fact, we were witch doctors. We ate human flesh. Those who had dealings with us would die of our sorcery, and be devoured. So went a story we heard on the mountain, and in an effort to break the hoodoo, one afternoon we had our headboy conduct a group of locals through the camp on a sightseeing tour. The visitors went away apparently satisfied that we were harmless enough, if a bit unusual. There was a second story, which we heard later. Hidden away in the forest, according to this, were stills in which a virulent liquor was made from mealies and potatoes. Our reception on the mountain was perhaps to be explained as just another case of moonshiners not liking strangers.

In some parts the forest was much broken by openings in the canopy, filled with regrowths—a condition hard to account for unless by the fall of strangling fig trees. A deciduous strangling fig of large size (*Ficus exasperata* Vahl) was very abundant in the forest. Several big specimens were found rotting on the ground. After the death and decay of its host tree, the latticed, tubular trunk of the fig seemed unable to support the weight of its own crown for any great length of time. The big fig trees were a favorite haunt of monkeys and squirrels which ate the fruits, only half grown on branchlets breaking into new leaf in September.

Another abundant deciduous tree of the canopy was *Albizzia gummifera* (Gmel.) C. A. Sm., made conspicuous by its reddish young leaves. Associated dominants collected included, most commonly, 17714, *Ehretia cymosa* Thonn., *Rauvolfia caffra* Sond., and *Celtis* 17744. Very large trees of *Khaya nyasica* Stapf occurred in gullies on the eastern slopes, and in the main forests giant *Dracaena* 17614, common also on Nchisi, had stems up to 4 or 5 feet thick at the base. Under subcanopy and substage tree layers, an often abundant woody undergrowth contained as a characteristic small tree *Rinorea burtt-davyi* Dunkley, bedecked with white flowers, and commonly *Achyranthes bidentata* Bl., *Peddiea fischeri* Engl., *Piper capense* L. f., *Coffea lignstroides* S. Moore, *Allophylus buchananii* Gilg, woody 17819 of the Acanthaceae, and in thinner shade the extremely hard-stinging nettle 17778. Herbaceous undergrowth consisted chiefly of a few common species such as *Cyperus pseudoleptocladus* Kükenth., 17739, the ferns *Pteris quadriaurita* Retz and *Tectaria gemmifera* (Fée) Alston, and under open canopy gregarious *Aframomum* 17777. Among numerous species of *Asplenium* in this forest, *A. auriculatum* (Thunb.) Kuhn often covered dry rocks, and others occurred as ground plants in moist gullies with *Dryopteris prismatica* (Desv.) C. Chr., large *Marattia salicifolia* Schrad., and a balsam (*Impatiens walleriana* Hook. f.) with showy dark carmine flowers. Also inhabiting gullies was a large purple-stemmed banana (*Musa* 17795) in clumps up to 20 feet high.

The primary forest was anything but rich in lianas, but fairly well provided with epiphytic ferns and orchids, the latter mostly in sterile condition. Mosses, too, were rather prominent with, for example, *Porotrichum commune* Hedw. enveloping lower tree trunks, *Leptodontium squarrosum* (Hook.) Par. covering rocks, and *Rhacopilum capense* C. M. carpeting logs. *Loxogramme lanceolata* (Sw.) Pr., *Asplenium mannii* Hook., *A. dregeanum* Kunze, and *A. sandersonii* Hook. grew commonly near the ground on trees, and *Streptocarpus goetzei* Engl. on rocks. In the treetop flora a *Viscum* parasitized various hosts; epiphytes included fleshy *Peperomia reflexa* (L. f.) A. Dietr., and among ferns *Oleandra africana* R. Bonap., *Asplenium aethiopicum* (Burm.) Bech., and *Vittaria* 17672. Of particular interest was *Rhipsalis cassutha* Gaertn., plentiful as a pendent epiphyte high on canopy trees and especially the big strangling figs, and also found on the rainmaker's rock. The presence of this cactus on Cholo has been discussed on the background of its New and Old World distribution by Anthony (1948). Whether or not a recent addition to the flora, it appeared as thoroughly at home in this African mountain environment as the other epiphytes with which it was associated.

The capacity of the forest to regenerate rapidly after destructive processes was demonstrated by vigorous second growth communities fringing the primary forest on lands which the natives had cleared, then abandoned in their shifting agriculture, and in openings in the forest resulting from the fall of large trees. Succession began with a coarse weed-grass stage on fallow lands, and passed through dense growths of herbs, shrubs, and small trees, to stands of quick-growing trees as much as 60 and 70 feet tall, from which the species of the primary forest finally assumed control. Many species took part in the second stage of this succession, for example *Justicia nyassana* Lindau, *Leonotis decadonta* Gürke, and *Argyrolobium shirense* Taub. as tall herbs; *Hewittia sublobata* (L. f.) O. Ktze., *Thunbergia alata* Boj., *Dolichos formosus* Hochst. ex A. Rich., and *Mikania cordata* (Burm. f.) B. L. Rob. as herbaceous climbers; *Vernonia podocoma* Sch. Bip., *Hibiscus gossypinus* Thunb., *H. vitifolius* L., and *Rubus exsuccus* Steud. as erect or scrambling shrubs; *Bersama abyssinica* Fres., *Crassocephalum mannii* (Hook. f.) Milne Redh., and *Maesa lanceolata* Forsk. as small trees. Stands of *Trema guineensis* (Schum.) Fical. and *Macaranga* 17736 comprised the tall tree stage.

On the steep slopes of the Rift Valley, woodlands of *Brachystegia* type succeeded the rain forests in altitudinal zonation below the mountain-top. Remnants of similar woodlands persisted as primary vegetation on the other slopes, where narrow and broad strips of gallery rain forest occurred along streams.

Collections from the area, including a few gatherings down to 2,750 feet on the Nswadzi River at the southeastern foot of the mountain, totalled 241 numbers. In the Nswadzi was collected the remarkable aquatic *Hydrostachys* 17642, attached in masses to submerged rocks and streaming to a length of two or three feet in the fast current.

Chikwawa. This camp, our last in Nyasaland, was in the hot, malarious valley of the lower Shire River. We were only 15 miles west of our Cholo Mountain camp site, but over 3,500 feet below it in the bottom of the Rift and in a part of the country vastly different in climate and vegetation. Before the railway became the main route into Nyasaland in 1915, and transport was by steamboats from the Zambezi, the head of navigation was about five miles below Chikwawa. From Blantyre, on the Shire Highlands to the northeast, our travel distance was about 30 miles by a steep, winding road with some hairpin bends on the escarpment so sharp that the truck could not get around them without being manoeuvred back and forth on the corners. For the last four or five miles the road crossed old alluvial plains of the Shire, through big sprawling villages and native cotton fields on flat, fertile lands elevated above the floods. Extensive low floodplain terraces bordering the river were planted to food crops of mealies and bananas. The mealie crop was lush and green, and in the tassel stage of development. In other parts of the country we had visited, the crop was harvested between May and August. Two crops of mealies could be produced here in the year. The people of the lower Shire had a priceless asset in their moist alluvial flats.

Through official courtesy we had as headquarters the district commissioner's residence at Chikwawa government station, vacant owing to shortage of personnel in the postwar period. This, and the territory we wished to work in, were on the west side of the Shire. The fast, eddying river, about 150 yards wide, was crossed on a steel pontoon manned by native ferrymen. Under control of a boss, one man steered and fended with a long bamboo pole, and nine paddlers in a boat, on the end of a long warping rope, raced to the other bank and made fast before the pontoon, already cast off into the current, drifted too far towards rapids which broke the river around an island downstream. The operation had elements of risk, but it was beautifully timed.

The official residence overlooked the river from a steep bluff about half a mile above the ferry. The high bank rose directly from the water to a height of about 80 feet and appeared to be the eroded edge of an ancient floodplain which extended back from the river for two or three miles. Elevation above sea level was about 350 feet.[2] Smoke haze from grass-fires, which burned day and night on the river plains and the mountains, obscured what would otherwise have been a fine view of the winding river and the heights of the eastern escarpment. The intense heat of the sun practically limited field work to the first few hours after daylight, and late afternoon. Maximum shade temperature rose to 97° and 98° F., and one evening at 8:30 the thermometer stood at 88 degrees. Average annual rainfall was about 30 inches.

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[2] On aneroid readings, subsequently found incorrect, an altitude of 200 m. (approximately 650 ft.) was given on the botanical field labels.

Lining the high riverbank at Chikwawa were very dry forests with brushy, thorny undergrowth and an assortment of much-branched trees up to 70 or 80 feet tall. This forest was largely deciduous and leafless and barren of flowers and fruits. *Tamarindus indica* L. and *Pterocarpus antunesii* (Taub.) Harms were common trees, and a *Strophanthus*, probably *S. kombe* Oliv., occurred as a large scrambling shrub. Large shrubs or small trees of the dense undergrowth included *Azina tetracantha* Lam., *Courbonia glauca* (Klotz.) Gilg & Bened., *Capparis rosea* (Klotz.) Oliv., and *? Acalypha* 17896. *Macrorungia formosissima* (Klotz.) C. B. Cl. was abundant as a stiff subshrub.

Out from the riverbank the elevated alluvial plain carried patches of the closed forest and a type of tall woodland or savanna forest in which *Acacia albida* Del. and *Cordyla africana* Lour., the latter with new leaves and a profusion of fragrant yellow flowers, were characteristic large trees of 60 to 80 feet. *Albizzia harveyi* Fourn., *Lonchocarpus capassa* Rolfe, *Boscia salicifolia* Oliv., *Royena macrocalyx* Gürke, *Steganotaenia araliacea* Hochst., and other species occurred as small trees. Many deciduous species of the woodlands were leafing out and flowering. Fires had left only remnants of a dense grass cover.

Dry stony ridges west of the river plain were occupied by woodlands of smaller trees, 20–50 feet tall, mostly deciduous and more or less bare of leaves. *Sterculia quinqueloba* (Garcke) K. Schum., made conspicuous by its smooth whitish bark, *Combretum transvaalense* Schinz, and *C. ternifolium* Engl. & Diels, were abundant elements. Other common trees included an "ebony" (*Dalbergia melanoxylon* Guill. & Perr.) forming pure stands locally, *Pterocarpus angolensis* DC., *Diospyros kirkii* Hiern with edible orange-colored fruits, *Stereospermum kunthianum* Cham., and *Diplorrhynchus condylicarpon* (Muell. Arg.) Pichon.

Toward the Mwanza tributary of the Shire, about 15 miles south of Chikwawa by road, parts of the sandy river plain were occupied by an open forest or savanna forest type of vegetation containing baobab trees (*Adansonia digitata* L.), *Combretum imberbe* Wawra, *Sterculia africana* (Lour.) Fiori, and *S. appendiculata* K. Schum., the latter a striking tall tree with blotched sycamore-like bark. Areas of brushy deciduous forest, habitat of the rare nyala antelope, contained numerous very large baobabs and a tall columnar *Euphorbia.* Sausage trees (*Kigelia*) grew plentifully on low alluvial ground, and *Acacia xanthophloea* Benth., with bright yellow bark, on floodplains. Groves of *Hyphaene crinita* Gaertn. were a feature of the Mwanza area. These very tall fan-palms stood in hundreds in dry open forest, but many of them had been topped and killed by native toddy tappers.

The Mwanza in its lower course was a wide sandy drift, fully 100 yards across, with shallow trickles of clear water braided out over the sand. Major elements of rich herbaceous growths on sandy beaches included *Cyperus maculatus* Boeck., *C. polystachyos* Rottb., *Fimbristylis dichotoma* (L.) Vahl., *Pennisetum purpureum* Schumach., *Epaltes alata* (Sond.) Steetz, *Nidorella microcephala* Steetz, tall *Sesbania sesban* (L.) Merr., and trailing *Merremia tridentata* (L.) Hall. f. and *Ipomoea aquatica* Forsk. *Nymphaea lotus* L. produced its white flowers in muddy pools in side channels.

In five field days, October 2 to 6, 139 botanical numbers were collected in the Chikwawa and lower Mwanza areas.

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PLANTS COLLECTED BY THE VERNAY NYASALAND EXPEDITION OF 1946*

J. P. M. BRENAN AND COLLABORATORS

MUSCI[3]

The mosses collected by Mr. L. J. Brass in association with the Vernay Nyasaland Expedition of 1946 give for the first time a fairly clear outline of the moss flora of this little-known region. The collection is noteworthy from the fact that the specimens are almost without exception in prime fruiting condition, in ample quantity, carefully selected and beautifully prepared.

Even though limited to fruiting plants the list of 22 genera comprising 51 species suggests some significant trends of geographical distribution. Although the bryological map of Central Africa has been pricked here and there no definite picture of the flora of this vast region is available at present or likely to be for a long while to come. Meanwhile all that can be done is to piece out the puzzle from time to time as the results of limited explorations come to light.

Broadly interpreted the collections listed below show a slight bond with Madagascar and Reunion through such species as *Tayloria borbonica* and *Daltonia minor* and a similar affinity with South Africa below the Zambesi River in *Campylopus inchangae, Leucoloma rehmanni, Leptodontium squarrosum, Macromitrium tenue,* etc. On the other hand a much stronger and more natural relationship with the great Central African region is suggested by the appearance of such representative species as *Campylopus stramineus, Pohlia elongata, Brachymenium capitulatum, Anomobryum filiforme, Daltonia patula, Lepidopilum lastii, Rhizofabronia sphaerocarpa, Trachyphyllum fabronioides, Pogonatum aloides,* and *Polytrichum piliferum.*

A complete series of the species listed below is in the herbarium of the New York Botanical Garden and a duplicate series in the herbarium of the writer.

SPHAGNACEAE

Sphagnum pycnocladulum C. Müll.

Mlanje District: Mlanje Mountain; Luchenya Plateau, massed on wet sunny rockfaces in forest, 1800 m., *16691.*

DITRICHACEAE

Ceratodon purpureus (Hedw.) Brid.

Mlanje District: Mlanje Mountain; Luchenya Plateau, terrestrial under *Widdringtonia* trees (½ shade), 1890 m., *16552* in part.

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*Certain specimens are represented only by a single sheet in the Herbarium of the New York Botanical Garden. These are distinguished in the text by an asterisk (*). The second set, comprising all the specimens not so marked, is in the Herbarium of the Royal Botanic Gardens, Kew; where also are the types of the new taxa here described, unless otherwise indicated.

All collections are by Brass unless another collector is named.

Names of those who collaborated are given with the taxa of which they contributed the accounts. Groups not thus credited to others are the work of J. P. M. Brenan, Royal Botanic Gardens, Kew.

Publication of the report was assisted by a contribution by Mr. Vernay.

[3] By Edwin B. Bartram.

Ditrichum flexifolium (Hook.) Hampe.

Mlanje District: Mlanje Mountain; Luchenya Plateau, moist, shaded erosion bank in grassland, 1900 m., *16628.* North Nyasa District: Nyika Plateau, shaded bare soil on grasslands, 2400 m., *17328;* ibid., moist peaty soil in thickets, 2400 m., *17192.*

DICRANACEAE

Dicranella subsubulata (Hampe) Jaeg.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on bauxite soil of an eroded shady bank, 1890 m., *16618;* ibid., terrestrial in moist forest shade, 1890 m., *16725.*

Dicranella minuta (Hampe) Jaeg.

Mlanje District: Mlanje Mountain; Luchenya Plateau, moist shaded erosion bank in grassland, 2000 m., *16633.*

Campylopus inchangae (C. Müll.) Par.

Mlanje District: Mlanje Mountain; Luchenya Plateau, terrestrial in semi-shade under *Widdringtonia* trees, 1890 m., *16553;* ibid., rotting stumps of *Widdringtonia* trees, 1890 m., *16562;* ibid., cushioned on a stump in semi-shade, 1890 m., *16592.*

Campylopus paludicola Broth.

Mlanje District: Mlanje Mountain; Luchenya Plateau, lower trunk of tree in forest, 1900 m., *16631.*

These plants agree well with the original description except for the armature of the upper leaf-margin, which is here sharply serrate rather than minutely serrulate as described and figured for the Rugege-Wald collection.

Campylopus stramineus (Mitt.) Jaeg.

North Nyasa District: Nyika Plateau, on low trees on grasslands, 2300 m., *17233.*

Evidently this is one of the smaller forms mentioned by Dixon in his remarks on the plants from Mt. Kenia (Smithson. Misc. Coll. 69^2: 10, 11. 1918). The leaves are less than 4 mm. long and the stems quite short. The costa in section shows a ventral row of large empty cells and a dorsal band of smaller cells without stereids.

Leucoloma rehmanni C. Müll. ex Par.

Mlanje District: Mlanje Mountain; Luchenya Plateau, pale bright green, epiphyte in river bank forest, 1820 m., *16559;* ibid., covering lower trunks of forest trees, in deep shade, 1890 m., *16539;* ibid., on tree trunks in deep forest shade, 1890 m., *16621.*

CALYMPERACEAE

Syrrhopodon obliquirostris C. Müll.

Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in rain-forest, 1860 m., *16449.*

POTTIACEAE

Leptodontium squarrosum (Hook.) Par.

North Nyasa District: Nyika Plateau, cushioned on exposed branches of trees, 2250 m., *17307, 17305.* Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in forest, 1820–1850 m., *16587, 16679, 16685, 16814.* Zomba District: Zomba Plateau, abundant on rocks in edge of rain-forest, 1820 m., *16165.* Cholo District: Cholo Mountain, covering rocks in open situations in rain-forest, 1400 m., *17695.*

These collections show considerable variation in the form of the leaf-apex just as *L. sulphureum* (C. Müll.) Mitt. does in tropical America. The forms with more slenderly acuminate leaves present no other distinguishing characters that I can detect and I doubt if they are deserving of special recognition.

Hyophila zeyheri (Hampe) Jaeg.

Mlanje District: Likubula Gorge, terrestrial in shade of a termite mound, 840 m., *16389.*

FUNARIACEAE

Funaria hygrometrica Hedw.

North Nyasa District: Nyika Plateau, disturbed soil on open grasslands, 2400 m., *17329.*

SPLACHNACEAE

Tayloria borbonica (Bory) Broth.

Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in forest, 1820–1890 m., *16450, 16588, 16620, 16689;* ibid., terrestrial in semi-shade under *Widdringtonia* trees, 1890 m., *16557.* North Nyasa District: Nyika Plateau, moist peaty soil in thickets, 2340 m., *17193.*

To judge from the above collections this species seems to be of frequent occurrence on the Luchenya Plateau. As far as I know these are the first records for the African mainland. It is known from Madagascar and Reunion.

BRYACEAE

Orthodontium lineare Schwaegr.

Mlanje District: Mlanje Mountain; Luchenya Plateau, small patch on trunk of forest tree in deep shade, 1890 m., *16540;* ibid., exposed crown of a tall *Widdringtonia* tree, 1890 m., *16545;* ibid., lower trunk of *Widdringtonia* tree, 2000 m., *16629.*

Mielichhoferia eckloni Hornsch.

North Nyasa District: Nyika Plateau, moist peaty soil in thickets, 2340 m., *17191.*

Pohlia elongata Hedw.

Mlanje District: Mlanje Mountain; Luchenya Plateau, terrestrial in semi-shade, 1890 m., *16554;* ibid., moist shaded erosion bank in grassland, 2000 m., *16630, 16632.*

Recorded from the Kilimanjaro region but otherwise not known from Africa. These collections seem to be typical in all respects. This species has an almost cosmopolitan distribution, being known from Europe, Japan, Yunnan, Himalayas, Philippines, Kerguelen, and North America.

Brachymenium capitulatum Mitt.

Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in forests, 1820–1860 m., *16448, 16593, 16690.* Cholo District: Cholo Mountain, crown of a rain-forest tree (on dead wood), 1200 m., *17786.*

Anomobryum filiforme (Dicks.) Husn.

Kota-kota District: Nchisi Mountain, on shaded hard soil in *Brachystegia* woodland, 1400 m., *17140.*

This species has an extensive north-and-south range on both sides of the Atlantic Ocean. The present collection represents the southern extremity of the range in Africa, while in the Western Hemisphere it extends southward through Mexico and Central America to Ecuador and has been reported from Uruguay by Mitten.

Bryum argenteum Hedw.

Mlanje District: Mlanje Mountain; Luchenya Plateau, exposed trunks of a forest tree, 1820 m., *16684* in part.

Bryum capillare Hedw.

Mlanje District: Mlanje Mountain; Luchenya Plateau, lower trunks of forest trees, 1820 m., *16590.*

Bryum truncorum Brid.

Zomba District: Zomba Plateau, occasional at bases of trees in rain-forest, 1450 m., *16209.* Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in forest, 1820 m., *16589, 16686.* Kota-kota District: Nchisi Mountain, abundant on rocks in *Brachystegia* woodland, 1400 m., *16946.*

MNIACEAE

Mnium longirostrum Brid.

North Nyasa District: Nyika Plateau, lower trunks of a tree in montane forest, 2250 m., *17275.*

RHIZOGONIACEAE

Rhizogonium spiniforme (Hedw.) Bruch.

Mlanje District: Mlanje Mountain; Luchenya Plateau, forming cushions on forest floor, 1880 m., *16800.*

BARTRAMIACEAE

Philonotis afro-fontana (C. Müll.) Par.

Mlanje District: Mlanje Mountain; Luchenya Plateau, massed on wet, sunny rock faces in forest, 1800 m., *16692.*

Breutelia gnaphalea (Beauv.) Schimp. ?

Mlanje District: Mlanje Mountain; Luchenya Plateau, massed on shaded seepage slopes, *16461.*

ORTHOTRICHACEAE

Macromitrium tenue (Hook. & Grev.) Brid.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on bamboos in forest, 1820 m., *16560;* ibid., on twigs of a forest bamboo, 1820 m., *16565* in part, *16594;* ibid., on isolated low trees on a bleak ridge, 2150 m., *16799;* ibid., on bark of a grassland shrub, 1950 m., *16831.* Cholo District: Cholo Mountain, crown of a rain-forest canopy tree, 1200 m., *17785.*

Macromitrium borbonicum (Besch.) Broth.

Mlanje District: Mlanje Mountain; Luchenya Plateau, small cushions on *Vellozia splendens* on grasslands, 1960 m., *16857;* ibid., cushioned on a relic tree on grassland, 1960 m., *16856;* ibid., epiphytic in forest undergrowth, 1890 m., *16829.*

Macromitrium mannii Jaeg.

Mlanje District: Mlanje Mountain; Luchenya Plateau, branches of trees on riverbanks, 1820 m., *16558;* ibid., on exposed trunks of forest trees, 1820 m., *16683.* North Nyasa District: Nyika Plateau, exposed branch of a tree in montane forest, 2100 m., *17310.*

Schlotheimia percuspidata C. Müll.

Mlanje District: Mlanje Mountain; Luchenya Plateau, trunk of tree in sunny forest edge, 1890 m., *16619.* Kota-kota District: Nchisi Mountain, exposed trunk of tree in edge of rain-forest, 1600 m., *17068.*

RHACOPILACEAE

Rhacopilum capense C. Müll.

Kota-kota District: Nchisi Mountain, lower trunk of tree, 1550 m., *17050*. Cholo District: Cholo Mountain, base of tree and log in rain-forest, 1200 m., *17727, 17729*.

NECKERACEAE

Porotrichum natalense C. Müll.

North Nyasa District: Nyika Plateau, trunks of trees in montane forest, 2250 m., *17304*.

Porotrichum comorense Hampe.

Cholo District: Cholo Mountain, seldom fertile, covering lower trunks of tree in rain-forest, 1300 m., *17694*.

HOOKERIACEAE

Daltonia minor Besch.

Mlanje District: Mlanje Mountain; Luchenya Plateau, carpeting an old log in deep forest, 1890 m., *16722*.

Daltonia patula Mitt.

Mlanje District: Mlanje Mountain; Luchenya Plateau, amongst the tufted branchlets of bamboos in forest, 1820 m., *16682;* ibid., twigs of a forest bamboo, 1820 m., *16596*.

These collections seem to be inseparable from the type gathering from Peak Clarence, Fernando Po, and the few plants from Usagara Mountains and Kilimanjaro represented on the sheet in the Mitten herbarium. They are more robust but structurally the same. As Mr. Brass' specimens are ample and in fine fruit they are a valuable supplement to our meagre knowledge of this rare species.

Lepidopilum lastii Mitt.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on bamboo twigs in forest, 1820 m., *16501;* ibid., epiphytic in forest, 1820 m., *16688*.

Through the kindness of the New York Botanical Garden I have been able to compare these collections with the type of *L. lastii* from the Mitten herbarium. Excepting that the setae in the Nyasaland plants are slightly longer (6–7 mm. instead of 3–4 mm.) the agreement is complete. It has been previously known only from the original gathering from the Usagara Mountains.

FABRONIACEAE

Rhizofabronia sphaerocarpa (Dus.) Fleisch.

North Nyasa District: Nyika Plateau, on stem of tree-fern in montane forest, 2250 m., *17267*.

The occurrence of this delicate and beautiful little moss in Nyasaland is a noteworthy fact. It has been found in Cameroon, Ruwenzori, and Usambara, but the present collection extends the range appreciably to the southward.

LESKEACEAE

Rhegmatodon secundus Kiaer.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on trunks of trees in dense forest shade, 1890 m., *16537*.

BRACHYTHECIACEAE

Brachythecium salebrosum Bruch., Schimp. & Gümb.

Mlanje District; Mlanje Mountain; Luchenya Plateau, epiphytic in forest, 1820 m.. *16687*.

Rhynchostegium brachypterum (Hornsch.) Jaeg.

Kota-kota District: Nchisi Mountain, lower trunk of a tree in rain-forest, 1550 m., *17049.*

ENTODONTACEAE

Erythrodontium subjulaceum (C. Müll.) Par.

Cholo District: Cholo Mountain, exposed trunk of a rain-forest tree, 1200 m., *17833.*

Entodon dregeanus (Hornsch.) C. Müll.

Cholo District: Cholo Mountain, base of tree in rain-forest, 1200 m., *17728;* ibid., on a dead log in rain-forest, 1200 m., *17784.* Zomba District, Zomba Plateau, epiphytic on riverbank trees, 1400 m., *16073.*

Trachyphyllum fabronioides (C. Müll.) Gepp.

Kota-kota District: Chia, base of trees in sandy *Brachystegia* woodlands, 480 m., *17556.*

SEMATOPHYLLACEAE

Sematophyllum dregei (C. Müll.) Bartr., comb. nov.

Hypnum dregei C. Müll. Syn. 2: 311. 1851.

Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic on forest undergrowth tree, 1890 m., *16830;* ibid., on a shaded log in forest, 1890 m., *16726;* ibid., on lower trunk of a *Widdringtonia* tree, 1890 m., *16555;* ibid., terrestrial in semi-shade under *Widdringtonia* tree, 1890 m., *16556.* Zomba District: Zomba Plateau, covering trunks of trees in riverine rain-forest, 1450 m., *16207.* North Nyasa District: Nyika Plateau, on decaying wood in montane forest, 2250 m., *17305.*

In the *Bryophyta of South Africa* Simm lists a long series of synonyms for this species but apparently it has never been included in *Sematophyllum* before. The distinctions between *Rhaphidorrhynchium* and *Sematophyllum* seem to me to be too slight to be of generic value.

Sematophyllum caespitosum (Hedw.) Mitt.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on granite boulders in bed of forest shade, 1820 m., *16595.*

HYPNACEAE

Mittenothamnium cavifolium (Rehm.) Bartr., comb. nov.

Eurhynchium cavifolium Par. Index 441. 1895.

Microthamnium cavifolium (Rehm.) Dix. Jour. Bot. 53: 21. 1915.

Mlanje District: Mlanje Mountain; Luchenya Plateau, covering rocks in bed of a forest stream, 1890 m., *16723;* ibid., creeping on a log in forest, 1890 m., *16693;* ibid., on lower trunks of forest trees, 1850 m., *16680.* Zomba District: Zomba Plateau, covering moist rocks in rain-forest, 1400 m., *16072.* Kota-kota District: Nchisi Mountain, on dead wood in rain-forest, 1500 m., *17048.*

As Cardot does not include this species in his long list of citations (Rév. Bryol. 40: 20–22. 1913), it seems necessary to validate the new combination.

Mittenothamnium cygnicollum (Hampe) Card.

Mlanje District: Mlanje Mountain; Luchenya Plateau, lower trunks of trees in deep forest shade, 1890 m., *16617.*

POLYTRICHACEAE

Pogonatum aloides (Hedw.) Beauv.

Mlanje District: Mlanje Mountain; Luchenya Plateau, moist clay erosion banks on grassland, 2000 m., *16657.*

Previously known in Central Africa only from Mt. Ruwenzori, but with a wide distribution from Madeira and the Canary Islands through Algeria and the Caucasus Mts. to the Himalayas, India, and Ceylon.

Polytrichum piliferum Hedw.

Mlanje District: a large cushion, 50 cm. in diameter, on a moist sunny rock, 2240 m., *16627.*

Polytrichum commune Hedw.

Mlanje District: Mlanje Mountain; Luchenya Plateau, massed on sterile soil in semi-shade, 1860 m., *16453.* Zomba District: Zomba Plateau, locally common on moist rocky slopes, 1500 m., *16245.* North Nyasa District: Nyika Plateau, occasional on bare ground on grasslands, 2400 m., *17330.*

PTERIDOPHYTA[4]

MARATTIACEAE

Marattia salicifolia Schrad. Gött. Gel. Anz. 1818: 920. 1818.

Marattia dregeana Pr. Suppl. Tent. Pterid. 9. 1845.
Marattia natalensis Pr. Suppl. Tent. Pterid. 9. 1845.
Marattia fraxinea Sm. var. *salicifolia* (Schrad.) C. Chr. Cat. Pl. Madag. Pterid. 67. 1932.

Mlanje District: Mlanje Mountain; Luchenya Plateau, one example in a moist forested ravine, more or less 1.5 m. high; leaves 2, bipinnate, 1890 m., July 13, 1946, *16818.* Kota-kota District: Nchisi Mountain, plentiful along streams in rain-forest, average plant with 7 arched and spreading leaves, 2 m. long, stipes half length of leaf, lamina about 1.25 m. wide, 1500 m., July 28, 1946, *17000.* Zomba District: Zomba Plateau, forms large spreading clumps, common in riverine rain-forest, 3.5 m. high, stem 30–40 cm. high, 20 cm. diam., not branched, stipes of typical leaf 1.70 m. long, stipes covered with dark brown scales at base, 1400 m., May 28, 1946, *16044.* Cholo District: Cholo Mountain, sporadic in rain-forest gullies, caudex large, more or less 40 cm. high, 50 cm. diam., leaves numerous, spreading, fleshy, stipes 70–90 cm. long, lamina 160–210 cm. long, 1200 m., Sept. 23, 1946, *17761.* Also in South Africa.

OSMUNDACEAE

Osmunda regalis L. Sp. Pl. 1065. 1753.

Zomba District: Zomba Plateau, abundant on wet shady banks of a stream in rain-forest, 1.2–1.5 m. high, leaves erect from a short branched stout stem about 15–20 cm. high, pale green, fertile ones much shorter than sterile, 1400 m., May 28, 1946, *16049.* Most temperate regions, tropical and South Africa, Mascarenes, West Indies and tropical America.

SCHIZAEACEAE

Mohria caffrorum (L.) Desv. Mém. Soc. Linn. 6: 198. 1827.

North Nyasa District: Nyika Plateau, common in sheltered situation on grasslands, 30–50 cm. high, leaves erect, 2300 m., Aug. 17, 1946, *17286.* Zomba District: Zomba Plateau, common in moist shade under rocks of an exposed summit, 15–40 cm. high, 1500 m., June 2, 1946, *16162.* East and South Africa, Mascarenes.

Mohria lepigera (Bak.) Bak. Ann. Bot. 5: 498. 1891.

Notochlaena lepigera Bak. Jour. Bot. 22: 53. 1884.

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[4] By F. Ballard, Royal Botanic Gardens, Kew.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common under shelter of rocks on grassland, 15–30 cm. high, leaves erect, bullate, 2100 m., June 27, 1946, *16484*. Tropical east Africa.

GLEICHENIACEAE

Gleichenia polypodioides (L.) J. E. Sm. Mém. Acad. Turin 5: 419. 1793.

North Nyasa District: Nyika Plateau, gregarious in small tangles, edges of montane forest on escarpment, 2100 m., Aug. 17, 1946, *17277*. Mlanje District: Mlanje Mountain; Luchenya Plateau, massed on sheltered precipitous slopes, 25–100 cm. high, leaves more or less glaucous below, 1870 m., July 8, 1946, *16741*. South Africa, Madagascar, Mauritius, and Amsterdam Island.

HYMENOPHYLLACEAE

Hymenophyllum capillare Desv. Mém. Soc. Linn. Paris **6**: 333. 1827.

Mlanje District: Mlanje Mountain; Luchenya Plateau, massed near ground on trunks of *Widdringtonia;* leaves pendent, brownish, 1890 m., June 30, 1946, *16538;* ibid., 1750 m., June 25, 1946, *16420*. Tropical east and west Africa, Mascarenes, and Tristan d'Acunha.

Hymenophyllum fumarioides Willd. Sp. Pl. 5: 526. 1810.

Hymenophyllum capense Schrad. Gött. Gel. Anz. **1818**: 919. 1818.
Hymenophyllum natalense v.d.B. Ned. Kr. Arch. 4: 386. 1859.
Hymenophyllum limminghei v.d.B. Ned. Kr. Arch. 5^3: 151. 1863.

North Nyasa District: Nyika Plateau, massed on lower trunk of a tree in montane forest, 2–4 cm. high, 2250 m., Aug. 16, 1946, *17260*. Mlanje District: Mlanje Mountain; Luchenya Plateau, in mass cushions on exposed branches of a tall *Widringtonia* tree, about 2 cm. high, 1890 m., June 30, 1946, *16547, 16548*. A small form in which some of the fronds are 1-pinnate only, regarded by Copeland (Phil. Jour. Sci. **64**: 133. 1937) as a geographical segregate of the Australian *H. rarum* R. Br. Extends from the Cape, through Nyasaland to the Mascarenes.

Hymenophyllum kuhnii C. Chr. Ind. Fil. 363. 1905.

Hymenophyllum meyeri Kuhn in Engl. Hochgebirgfl. Trop. Afr. 94. 1892. Non Pr.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in large masses on trunks of trees along a stream, leaves pendent, 1750 m., June 25, 1946, *16418;* ibid., massed low on tree trunks in moist primary forest, 1890 m., July 13, 1946, *16822*. Tropical east Africa, San Thomé, Annobon.

Hymenophyllum polyanthos Sw. Jour. Bot. Schrad. **1800^2**: 102. 1801.

Mecodium polyanthos (Sw.) Copel. Phil. Jour. Sci. 67: 19. 1938.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in large masses on tree trunks in rain-forest, 1800 m., June 25, 1946, *16413;* ibid., common epiphyte in deep forest shade, about 10 cm. high, 1890 m., June 30, 1946, *16535*. An aggregate species with an impressive synonymy. Pantropical.

Trichomanes mandioccanum Raddi, Plant. Bras. 1: 64. 1825.

Mlanje District: Mlanje Mountain; Luchenya Plateau, wet mossy bank of a stream in forest, leaves stiff, very dark green, 1890 m., July 13, 1946, *16819*. A species common to Brazil and tropical Africa.

Trichomanes melanotrichum Schlechtend. Adumbr. Fil. 56. 1832?

Kota-kota District: Nchisi Mountain, covering moist rocks in rain-forest, 3–4 cm. high, 1500 m., July 28, 1946, *17001*. Mlanje District: Mlanje Mountain; Luchenya Plateau, massed on lower tree trunks in primary forest, 1890 m., July 13, 1946, *16823*. Tropical and South Africa, Mascarenes.

PTERIDACEAE

Adiantum capillus-veneris L. Sp. Pl. 1096. 1753.

Cholo District: Cholo, plentiful on rocks in riverine rain-forest, 30–40 cm. high, 900 m., Sept. 30, 1946, *17878*. An inhabitant of damp places in most tropical and subtropical countries, extending northwards to Britain. The common maidenhair fern which in the tropics is restricted to high altitudes.

Adiantum caudatum L. Mant. 308. 1771.

Mlanje District: Likubula Gorge, on moist shaded rocks in woodlands, proliferous, 1200 m., June 21, 1946, *Vernay 16393*. A common species of the Old World tropics and subtropics.

Adiantum poiretii Wikstr. Sv. Vet.-Akad. Handl. 1825: 443. 1826.

North Nyasa District: Nyika Plateau, occasional in edges of montane forest, 30–80 cm. high, rhizome horizontal and shortly creeping, 2340 m., Aug. 19, 1946, *17339*. Tropics and subtropics of Africa and islands, India, Central and South America. Resembles *A. aethiopicum* L., but laminal nerves end in sinuses between marginal teeth.

Cheilanthes multifida Sw. Syn. Fil. 129: 334. 1806.

Zomba District: Zomba Plateau, crowded in moist shade on an exposed rocky summit, 50–70 cm. high, 1820 m., May 31, 1946, *16123*. Mlanje District: Mlanje Mountain; Luchenya Plateau, primary forest undergrowth, c. 1.5 m. high, clumps of several leaves, rhizome erect, 1890 m., July 12, 1946, *16804*. Tropical east and South Africa. If *Adiantopsis* Fée be accepted, the present species would probably be more correctly placed therein.

Doryopteris concolor (Langsd. & Fisch.) Kuhn in Deck. Reis. in Ostafr. 3^3: Bot. 19. 1879.

Mlanje District: Mlanje Mountain; Likubula Gorge, on moist shaded rocks in woodlands, 1200 m., June 21, 1946, *Vernay 16392*. Pantropical. This collection includes fronds showing the typical pteroid condition mixed with others with interrupted sori, generally known as var. *kirkii* (Hook.) Hieron.

Notholaena buchanani Bak. in Hook. & Bak. Syn. Fil. 373. 1868.

Mlanje District: Mlanje Mountain, south-west ridge, in dry shelter of a rock on grassland, 2150 m., June 28, 1946, *16522**; ibid.; Luchenya Plateau, 1900 m., July 7, 1946, *16704**; ibid., 2200 m., July 11, 1946, *16782**. South Africa, Rhodesia, Mozambique.

Pellaea doniana (J. Sm.) Hook. Sp. Fil. 2: 137. 1858.

Cholo District: Nswadzi River, terrestrial in riverine rain-forest, 80–90 cm. high, clumps of several arched leaves, rhizome short, horizontal, 840 m., Sept. 29, 1946, *17865*. Tropical Africa.

Pellaea dura (Willd.) Bak. Jour. Bot. 18: 327. 1880.

Kota-kota District: Nchisi Mountain, amongst rocks in *Brachystegia* woodland, dry and withered after the rains, about 60 cm. high, 1500 m., July 26, 1946, *16964*. Zomba District: Zomba Plateau, frequent in dry rocky situations, 25–50 cm. high, leaves erect, pale, stiff, 1500 m., June 2, 1946, *16151*. South Africa and Mascarenes.

Pellaea goudotii (Kunze) C. Chr. Ind. Fil. 480. 1906.

Kota-kota District: Nchisi Mountain, frequent under rocks in *Brachystegia* woodland, 25–40 cm. high, dry and withered after the rains, 1400 m., July 24, 1946, *16912*. South Africa and Mascarenes.

Pellaea quadripinnata (Forsk.) Prantl, Bot. Jahrb. 3: 420. 1882.

North Nyasa District: Nyika Plateau, open place in montane forest, 2350 m., Aug. 17, 1946, *17300.** Arabia, east and South Africa, Mascarenes.

Pellaea swynnertoniana Sim, Ferns S. Afr. ed. 2. 213. 1915.

Zomba District: Zomba Plateau, one clump in a rock crevice in *Brachystegia* woodland, 45 cm. high, leaves stiff, grey-green, very brittle, 1500 m., June 4, 1946, *16227.* Related to *P. calomelanos* (Sw.) Link but differs by its ivy-leaf-shaped pinnules and brown, not blackish, stipes and rachises. Tanganyika through Rhodesia and Nyasaland to Portuguese East Africa.

Pityrogramma aurantiaca (Hieron.) C. Chr. Ind. Fil. Suppl. 3: 138. 1934.

North Nyasa District: Nyika Plateau, one clump in a grassy bog, about 30 cm. high, 2340 m., Aug. 19, 1946, *17331.* Tropical Africa.

Pteridium aquilinum (L.) Kuhn in Deck. Reisen Ost-Afr. 3^3: Bot. 11. 1879.

North Nyasa District: Nyika Plateau, abundant on grassy edges of bogs and on disturbed ground on open grassland, 60–100 cm. high, killed back by forest, 2340 m., Aug. 19, 1946, *17327.* All temperate and tropical regions, where it frequently constitutes an abnoxious weed. Adopting Tyron's nomenclature (Rhodora 43. 1941) the present plants become "*P. aquilinum* ssp. *typicum* Tryon var. *typicum* Tryon." Presumably this should now read "*P. a.* ssp. *aquilinum* var. *aquilinum.*" Its distribution is said to be Europe, Africa, and islands.

Pteris quadriaurita Retz. Obs. Bot. 6: 38. 1791. sens lat.

Kota-kota District: Nchisi Mountain, common ground fern in primary rain-forest, 1–1.5 m. high, leaves few, rhizome ascending, 1550 m., July 30, 1946, *17039.* Mlanje District: Mlanje Mountain; Luchenya Plateau, forest undergrowth, 180 cm. high, leaves many, arched from a short thick erect caudex, 1890 m., July 6, 1946, *16694.* Cholo District: Cholo Mountain, a characteristic fern of the rain-forest undergrowth, 1–1.2 m. high, leaves few, arched, rhizome ascending, 1200 m., Sept. 24, 1946, *17794.* A broad concept of this species complex is adopted here. In this sense the species is pantropical.

DAVALLIACEAE

Arthropteris monocarpa (Cord.) C. Chr. Cat. Pl. Madag. Pterid. 32. 1932.

North Nyasa District: Nyika Plateau, common epiphyte in montane forest, rhizomes climbing, to 2 m. long, leaves distant, 2340 m., Aug. 19, 1946, *17336.* Zomba District: Zomba Plateau, very abundant, climbing on trees and creeping on rocks in riverine rain-forest, leaves thin and soft, 30–40 cm. long, 1400 m., May 28, 1946, *16050;* ibid., abundant on rain-forest floor, 60–80 cm. high, rhizome creeping and branching underground in rain-forest floor, 1450 m., June 3, 1946, *16175.* Mlanje District: Mlanje Mountain; Luchenya Plateau, locally gregarious in forest undergrowth, 40–60 cm. high, leaves arched, rhizome creeping, 1890 m., July 6, 1946, *16703;* ibid., low epiphyte in forest, 30–50 cm. high, 1820 m., July 5, 1946, *16672.* Throughout tropical east and South Africa and in the Mascarenes; not so common in west Africa. An oblique articulation is present in the lowermost third of the stipe. The sori are solitary on the segments and there are usually no lime-spots on the upper surface of the fronds as in the related *A. orientalis* (Gmel.) Posth.

Nephrolepis cordifolia (L.) Pr. Tent. Pterid. 79. 1836.

N. undulata (Afz. ex Sw.) J. Sm. Bot. Mag. 72: Comp. 35 (bis). 1846.

Zomba District: Zomba Plateau, local on moist sunny banks of creeks, gregarious, 50–70 cm. high, leaves erect, pale, tubers produced on rhizomes, 1500 m., June 7, 1946, *16299*. Pantropical. The African form of this common, widely spread, probably aggregate, species has been known as *N. undulata* but such specific segregation is open to doubt.

Oleandra distenta Kunze, Bot. Zeit. 9: 347. 1851.
O. africana R. Bonap. Notes Ptérid. 14: 257. 1923.

Zomba District: Zomba Plateau, climbing and pendent from trees and rocks in riverine rain-forest, rhizomes several metres long, 1400 m., May 28, 1946, *16061;* ibid., stems massed and tangled on a rock on river bank, 1500 m., June 7, 1946, *16320.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common epiphyte in forest, 1890 m., June 30, 1946, *16534;* ibid., common in primary forest, 1890 m., July 12, 1946, *16808.* Cholo District: Cholo Mountain, occasional high epiphyte in rain-forest, 1300 m., Sept. 20, 1946, *17671.* Tropical and South Africa, Mascarenes.

CYATHEACEAE

Cyathea capensis (L.f.) J. E. Sm. Mém. Acad. Turin 5: 417. 1793.
Hemitelia capensis (L.f.) Kaulf. Enum. Fil. 253. 1824.

Mlanje District: Mlanje Mountain; Luchenya Plateau, plentiful in forest ravines, 2–5 m. high, from plant 2.5 m. high, stem 15 cm. diam. at apex, more slender below, leaves 10, rather flat, spreading, 140–160 cm. long, 1820 m., July 2, 1946, *16600.*

Cyathea dregei Kunze, Linnaea 10: 551. 1836.

Kota-kota District: Nchisi Mountain, in rain-forested gulley, 2–3 m. high, stem 2.5 m. tall, 28 cm. thick at base, 21 cm. at apex, simple or producing small lateral branches, leaves 16, flat-spreading, 160 cm. long, lamina oblanceolate, stipes 45–60 cm. long, pinnae gray below, 1400 m., Aug. 2, 1946, *17102.* Zomba District: Zomba Plateau, scattered along banks of streams in open grasslands, tree-fern up to 6 m. high, leaves 21, more or less 1.5 m. long, leaf segments bullate, glossy above, 2 small sterile pinnae opposite at base of stipes, flower stem thickest at apex, leaf bases not persistent, crown flat-spreading, the specimens from a plant more or less 4 m. tall × 20 cm. greatest stem, 1770 m., May 31, 1946, *16137.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common and conspicuous in forest ravines, and often found in grassy gullies away from forest, tree-fern 3–8 m. high, specimen 5 m. tall, stem 35 cm. diam. at apex, leaves 21, 220–240 cm. long, stem thick, crown umbrella-shaped, leaf bases not persistent, 1820 m., July 5, 1946, *16675.*

Cyathea usambarensis Hieron. in Engl. Planzenw. Ost.-Afr. C: 88. 1895.

North Nyasa District: Nyika Plateau, common in a gulley in montane forest, 2–3 m. high, stem 6 cm. thick, including persistent leaf bases of the apical part of the fibrous remains of leaf bases on the lower part, 2300 m., Aug. 13, 1946, *17209.* Tropical east Africa. *C. deckenii* Kuhn may possibly be the same species but the original description is inadequate and no authentic material is to hand.

ASPIDIACEAE

Athyrium schimperi Moug. ex Fée, Gen. Fil. (V Mém.) 187. 1850–1852.

Zomba District: Zomba Plateau, erect in small clumps, moist shady roadside, leaves more or less fleshy, 1450 m., June 4, 1946, *16204.* Abyssinia, Cameroons, Uganda, Tanganyika Territory, South Africa, and north India.

Didymochlaena truncatula (Sw.) J. Sm. Jour. Bot. 4: 196. 1841.
D. lunulata Desv. Prodr. 282. 1827.

Kota-kota District: Nchisi Mountain, common on banks of streams in rain-forest, 1–1.5 m. high, leaves arched and spreading from short erect caudex, 10–15 cm. high, 1500 m., July 28, 1946, *17012.* Cholo District: Cholo Mountain, one clump in a rain-forest gulley, 2 m. high, 1200 m., Sept. 23, 1946, *17752.* Pantropical with a few geographic variants.

Diplazium arborescens (Bory) Sw. Syn., Fil. 92. 1806.

Cholo District: Cholo Mountain, occasional in rain-forest gullies, 180–250 cm. high, leaves few, erect from a short stout caudex, petiole 50–60 cm. long, 1200 m., Sept. 23, 1946, *17758.* Also in San Thomé and Mascarenes.

Dryopteris bergiana (Schlechtend.) Kuntze, Rev. Gen. Pl. 2: 812. 1891.
Lastrea bergiana (Schlechtend.) Moore, Ind. Fil. 86. 1858.

North Nyasa District: Nyika Plateau, gregarious on wet banks of a grassland stream, leaves pendent, hanging over the water, 2300 m., Aug. 14, 1946, *17219.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common in forest openings, more or less 1 m. high, 1820 m., July 1, 1946, *16568;* ibid., one example in forest undergrowth, 80 cm. high, leaves several, arched, rhizome erect, 1890 m., July 7, 1946, *16711;* ibid., leaves dimorphous, the fertile more erect, and usually much longer than the sterile, common on edges of streams in dense forest shade, 80–120 cm. high, rhizome erect, 1890 m., July 7, 1946, *16712.* Tropical and South Africa, Madagascar.

Dryopteris dentata (Forsk.) C. Chr. Vid. Selsk. Skr. 6: 24. 1920.
Cyclosorus dentatus (Forsk.) Ching, Bull. Fan. Mem. Inst. Biol. Bot. 8: 206. 1938.

Kota-kota District: Nchisi Mountain, common ground fern in rain-forests, 60–70 cm. high, 1400 m., July 30, 1946, *17045;* ibid., frequent on banks of streams in rain-forest, about 1 m. high, leaves several, erect from a thick erect rhizome, 1500 m., July 28, 1946, *16999.* An aggregate species, as generally understood, occurring throughout tropical and subtropical Africa, Asia, and America.

Dryopteris kilemensis (Kuhn) Kuntze, Rev. Gen. Pl. 2: 813. 1891.
Dryopteris lastii (Bak.) C. Chr. Ind. Fil. 274. 1905.

North Nyasa District: Nyika Plateau, montane forest undergrowth, 80–150 cm. high, 2350 m., Aug. 17, 1946, *17285.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common locally in forest undergrowths, 80–120 cm. high, leaves several, arched and spreading from a short erect stalk, 1890 m., July 7, 1946, *16707.* Tropical east Africa.

Dryopteris lanuginosa (Willd. ex Kaulf.) C. Chr. Ind. Fil. 273. 1905.
Ctenitis lanuginosa (Willd. ex Kaulf.) Copel. Gen. Fil. 124. 1947.

Kota-kota District: Nchisi Mountain, common in wet gullies in rain-forest, 80–150 cm. high, leaves arched, 1550 m., July 30, 1946, *17040.* Cholo District: Cholo Mountain, occasional in rain-forest gullies, 1.5–1.8 m. high, leaves few, arched and spreading from a stout caudex, 20–30 cm. high, 1200 m., Sept. 23, 1946, *17757.* Also in west and South Africa and Mascarenes.

Dryopteris oligantha (Desv.) C. Chr. Ind. Fil. Suppl. 3: 93. 1934.
Dryopteris inaequalis (Schlechtend.) Kuntze, Rev. Gen. Pl. 2: 813. 1891.

Zomba District: Zomba Plateau, rain-forest undergrowth, uncommon, 70–80 cm. high, rhachis horizontal, leaves few, arched, 1400 m., May 28, 1946, *16055.* Throughout tropical and South Africa.

Dryopteris prismatica (Desv.) C. Chr. Dansk Bot. Ark. 7: 202. 1932.
Dryopteris caudiculata (Sieb.) C. Chr. Dansk Bot. Ark. 7: 50. 1932.
Cylosorus prismaticus (Desv.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10: 248. 1941.

Cholo District: Cholo Mountain, sporadic in rain-forest gullies, leaves few, erect, pale green, 1200 m., Sept. 23, 1946, *17764*. A Mascarene species allied to the west African *D. venulosa* O. Kuntze. Apparently uncommon in tropical east Africa.

Dryopteris prolixa (Willd.) Kuntze, Rev. Gen. Pl. 2: 813. 1891.
Lastrea prolixa (Willd.) Pr. Tent. Pterid. 75. 1836.
Thelypteris prolixa (Willd.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10: 254. 1941.

Cholo District: Nswadzi River, terrestrial on shaded river-bank, 840 m., Sept. 29, 1946, *17867*. Tropical east Africa and Mascarenes. The Asian *D. ochthodes* (Kunze) C. Chr. is a close relative.

Dryopteris silvatica (Pappe & Raws.) C. Chr. Ind. Fil. 292. 1905.
Goniopteris patens Fée, Gen. Fil. (V Mém.) 253. 1850–1852.
Goniopteris silvatica Pappe & Raws. Syn. Fil. Afr. Austr. 39. 1858.
Cyclosorus silvaticus (Pappe & Raws.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10: 249. 1941.
Cyclosorus patens (Fée) Copel. Gen. Fil. 143. 1947.

Zomba District: Zomba Plateau, rain-forest undergrowth, not common, several leaves c. 2 m. long, spreading from a stout stem c. 30 cm. high, leaves proliferous, 1450 m., June 3, 1946, *16187*.* Tropical and South Africa, Mascarenes.

Dryopteris zambesiaca (Bak.) C. Chr. Ind. Fil. 301. 1905.
Cholo District: Cholo Mountain, one clump in a rain-forest gulley, 180 cm. high, leaves few, erect from a very short caudex, 1200 m., Sept. 23, 1946, *17760*. Tropical east Africa, Mascarenes.

Elaphoglossum aubertii (Desv.) Moore, Ind. Fil. 5. 1857.
North Nyasa District: Nyika Plateau, terrestrial in montane forest, 30–40 cm. high, 2250 m., Aug. 16, 1946, *17243*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common on rocks, in dense forest shade, leaf margins undulate, 1890 m., July 12, 1946, *16812*. Tropical and South Africa, Mascarenes, tropical America.

Elaphoglossum conforme (Sw.) Schott, Gen. Fil. *pl. 14*. 1834.
Mlanje District: Mlanje Mountain, massed on exposed branches of a tall *Widdringtonia* tree, 20–50 cm. high, leaves stiff, coriaceous. An aggregate pantropical species. The rhizome scales of this specimen are narrower than in the typical form from St. Helena but in other respects there is general agreement.

Elaphoglossum hybridum (Bory) Moore, Ind. Fil. 10. 1857.
Zomba District: Zomba Plateau, several tufts on a moist shady bank of river, leaves sub-pendent, sterile ones up to more or less 60 cm. long, 1500 m., June 7, 1946, *16302*. Mlanje District: Mlanje Mountain, frequent on lower trunks of forest trees, about 40 cm. high, leaves more or less fleshy, only one fertile plant found, 1820 m., July 5, 1946, *16662**. *Brass 16302* is a particularly large and robust specimen resembling forms from the Comoros and Madagascar. Tropical east Africa, South Africa, tropical America.

Elaphoglossum spathulatum (Bory) Moore, Ind. Fil. 14. 1857.
E. ulugurense Reimers, Notizbl. Bot. Gart. Berl. 12: 80. 1934.

Mlanje District: Mlanje Mountain; Luchenya Plateau, locally gregarious on shaded mossy rocks in bed of forest stream, 5–12 cm. high, fertile leaves at first green, late yellow, 1820 m., July 5, 1946, *16671*. Northern Rhodesia, South Africa, Mascarenes, Ceylon. The tropical American *E. piloselloides* (Pr.) Moore and *E. horridulum* (Kaulf.) J. Sm. are closely related.

Polystichum ammifolium (Poir.) C. Chr. Cat. Pl. Madag. Pterid. 31. 1932.

North Nyasa District: Nyika Plateau, common in montane forest, 50–90 cm. high, leaves few, arched, 2250 m., Aug. 16, 1946, *17255*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common in openings in forest, more or less 1.5 m. high, clumps of several arched leaves from a stout erect stock, 1820 m., July 1, 1946, *16566;* ibid., primary forest undergrowth, 80–100 cm. high, several leaves from a short erect rhizome, 1890 m., July 13, 1946, *16820;* ibid., one example in forest undergrowth, 1 m. high, rhizome erect, 1890 m., July 7, 1946, *16708**. The teeth in the ultimate divisions of the frond of this species are seldom aristate. The species seems to belong to a complex of forms centred around the European *P. setiferum* (Forsk.) Woynar. Rhodesia, South Africa, Mascarenes.

Tectaria gemmifera (Fée) Alston, Jour. Bot. 77: 288. 1939.

T. coadunata (Wall.) Copel. var. *gemmifera* (Fée) C. Chr. Dansk Bot. Ark. 7: 67. 1932.

Kota-kota District: Nchisi Mountain, one plant on bank of stream in rain-forest, 1.5 m. high, leaves few, erect from a horizontal rhizome, 1500 m., July 28, 1946, *17003;* ibid., plentiful on rain-forest floor, 60–100 cm. high, 1500 m., July 28, 1946, *17004*. Cholo District: Cholo Mountain, seldom fertile, plentiful in rain-forest undergrowth, 75–150 cm. high, 1200 m., Sept. 23, 1946, *17751*. Tropical Africa, South Africa, Mascarenes.

BLECHNACEAE

Blechnum attenuatum (Sw.) Mett. Fil. Hort. Bot. Lips. 64. 1856.

Zomba District: Zomba Plateau, up to 1 m. high, leaves stiff, many, from an erect thick stock up to 20 cm. long, pinnae strongly recurved, 1450 m., June 3, 1946, *16172*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common epiphyte on trunks of tree ferns in forest, 60–100 cm. high, fertile leaves shorter than the sterile, 1880 m., July 8, 1946, *16743*. Tropical and South Africa and Mascarenes. There are forms in South America and Polynesia which may eventually prove to be distinct.

Blechnum tabulare (Thunb.) Kuhn, Fil. Afr. 94. 1868.

North Nyasa District: Nyika Plateau, abundant in open marshes (now mostly frost-bitten and brown), 1–1.5 m. high, leaves numerous, arched from a large upright stem to 60 cm. tall, 15–20 cm. diam., stem covered with brown rootlets, fertile leaves somewhat longer than the sterile, 2340 m., Aug. 13, 1946, *17210*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common in moist situations on open grass slopes, more or less 40–80 cm. high, numerous stiff leaves from the apex of a thick prostrate stem about 25–35 cm. long by 10–15 cm. diam., sterile leaves about two-thirds the length of the fertile, 2140 m., June 27, 1946, *16480*. Tropical and South Africa and Mascarenes. The temperate south American form of the species has been known as *B. magellanicum* (Desv.) Mett.

ASPLENIACEAE

Asplenium rutaefolium (Berg.) Kunze, Linnaea 10: 521. 1836.

Lonchitis bipinnata Forsk. Flor. Aegypt.-Arab. 184. 1775.

Asplenium bipinnatum (Forsk.) C. Chr. ex Hieron. in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 1907–1908 2: 11. 1910.

Mlanje District: Mlanje Mountain; Luchenya, epiphytic on trunks of forest trees, 30–50 cm. high, leaves numerous, arched, fleshy, locally common, 1890 m., July 2, 1946, *16605*. Extends from the type locality in the Yemen through east to South Africa; found also in Madagascar. Resembles *A. thunbergii* Kunze to some extent but the fronds are fleshy and are not proliferous.

Asplenium aethiopicum (Burm.f.) Bech. Candollea 6: 23. 1935.
Asplenium praemorsum Sw. Nov. Gen. & Sp. Pl. 130. 1788.
Asplenium furcatum Thunb. Prodr. Fl. Cap. 2: 172. 1800.
Asplenium filare (Forsk.) Alston, Jour. Bot. 72: Suppl. 4. 1934.

Zomba District: Zomba Plateau, occasional on ground in riverine rain-forest; 60–80 cm. high, leaves arched, very dark green, rhizome horizontal, 1400 m., May 28, 1946, *16053;* ibid., common epiphyte in rain-forest, small clumps, 50–60 cm. high, 1450 m., June 3, 1946, *16191;* ibid., terrestrial in riverine rain-forest, one clump seen, 50 cm. high, 1400 m., May 28, 1946, *16063**. Mlanje District: Mlanje Mountain; Luchenya Plateau, terrestrial in rain-forest regrowths, 40–70 cm. high, rhizome erect, 1860 m., June 26, 1946, *16440;* ibid., 1890 m., June 30, 1946, *16530.* Cholo District: Cholo Mountain, epiphytic, high on a rain-forest tree, 1350 m., Sept. 20, 1946, *17675.* A confusing species known from tropical America, Asia, and Madeira in addition to Africa and the Mascarenes. The Madeira form is known to be a polyploid with n = 144 (Manton, Probl. Cytol. Evol. Pterid. 283. 1950).

Asplenium cristatum Lam. Encyc. 2: 310. 1786.
Asplenium cicutarium Sw. Prodr. 130. 1788.

Cholo District: Cholo Mountain, low epiphyte in rain-forest, 30–40 cm. high, 1400 m., Sept. 27, 1946, *17838.* Mlanje District: Mlanje Mountain; Luchenya Plateau, under dense shade on forest floor, apparently rare, 30–40 cm. high, 1890 m., July 7, 1946, *16715.* There seems no doubt that the African specimens fall within the ambit of the tropical American *A. cristatum.* Specimens have been seen from the Transvaal, S. Rhodesia, as well as from Nyasaland. Sim in the *Ferns of South Africa* (1915) confused the Transvaal plant with *Loxoscaphe nigrescens* (Hook.) Moore, to which, when infertile, it bears some resemblance. Of the specimens quoted above, *17838* has a tripinnate-pinnatifid frond whereas that of *16715* is bipinnate-pinnatifid. The last also possesses proliferation buds at the frond apices.

Asplenium dregeanum Kunze, Linnaea 10: 517. 1836.

Kota-kota District: Nchisi Mountain, gregarious on rocks in rain-forest, 20–30 cm. high, leaves spreading, fleshy, 1500 m., July 29, 1946, *17028.* Zomba District: Zomba Plateau, massed on trunk of a rain-forest tree overhanging a stream, 30 cm. high, leaves somewhat fleshy, proliferous, 1400 m., May 28, 1946, *16052.* Mlanje District: Upper Ruo River, rain-forest, 850 m., July 4, 1946, *Vernay 16660**. Cholo District: Cholo Mountain, common gregarious low epiphyte in rain-forest, 1350 m., Sept. 20, 1946, *17673;* ibid., epiphyte on lower trunks of trees in rain-forest, leaves pendent, 1300 m., Sept. 20, 1946, *17686.* Tropical and South Africa and Mascarenes. Probably a dareoid or dissected state of *A. sandersoni* Hook.

Asplenium friesiorum C. Chr., Notizbl. Bot. Gart. Berl. 9: 181. 1924; F. Ballard, Hook. Ic. *pl. 3366.* 1938.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in forest openings, height 1–1.5 m., leaves very dark green, stipes and rachis black, 1820 m., July 1, 1946, *16582.* North Nyasa District: Nyika Plateau, montane forest borders, 1.5–2 m. high, 2250 m., Aug. 16, 1946, *17273.* Tropical east Africa, South Africa, Mascarenes.

Asplenium gemmiferum Schrad. Gött. Gel. Anz. 1818: 916. 1818.

Kota-kota District: Nchisi Mountain, common on rocks in rain-forest, 50–70 cm. high, leaves spreading, fleshy, proliferous, 1500 m., July 28, 1946, *17011.* Cholo

District: Cholo Mountain, occasional in rain-forest gullies, 60–90 cm. high, leaves few, fleshy, 1200 m., Sept. 23, 1946, *17753*. East and South Africa, Mascarenes.

Asplenium inaequilaterale Willd. Sp. Pl. 5: 322. 1810.

Kota-kota District: Nchisi Mountain, common on banks of streams in rain-forest, 30–50 cm. high, leaves spreading, dark and glossy above, 1500 m., July 28, 1946, *17006*. Cholo District: Cholo Mountain, locally gregarious in rain-forest undergrowth, 50–70 cm. high, 1350 m., Sept. 20, 1946, *17669;* ibid., on moist rocks in a rain-forest gulley, 25–40 cm. high, 1200 m., Sept. 23, 1946, *17759*. Tropical Africa, America, south India, and Ceylon. Has often been identified with the tropical American *A. laetum* Sw.

Asplenium lumulatum Sw. Jour. Bot. Schrad. 1800^2: 52 (1801) forma **lunulatum.**

Asplenium lunulatum f. *typica* C. Chr. Dansk Bot. Ark 7: 94. 1932.

North Nyasa District: Nyika Plateau, on ground in montane forest, 2250 m., Aug. 16, 1946, *17240B*. Tropical and South Africa, Mascarenes. There are closely related species in other tropical areas.

Asplenium mannii Hook. Sec. Cent. Ferns *pl. 60*. 1861.

Kota-kota District: Nchisi Mountain, low epiphyte in rain-forest, rare, 5–6 cm. high, leaves yellowish, somewhat fleshy, 1650 m., July 31, 1946, *17064*. Cholo District: Cholo Mountain, gregarious low on small trees in rain-forest, 1350 m., Sept. 20, 1946, *17677*. Tropical Africa, South Africa, Madagascar.

Asplenium megalura Hieron. in Wiss. Deutsch. Zentr.-Afr. Exp. 2: 17. 1910.

Zomba District: Zomba Plateau, one clump on an exposed rocky clump, 25 cm. high, 1500 m., June 2, 1946, *16152;* ibid., low epiphyte in edge of rain-forest, 25 cm. high, 1450 m., June 4, 1946, *Vernay 16210*. Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent epiphyte in forest, leaves pendent, up to 120 cm. long, 1890 m., June 30, 1946, *16528;* ibid., epiphytic on trees overhanging a stream, 1750 m., June 25, 1946, *16419*;* ibid., epiphytic on a relic forest tree, 1890 m., July 14, 1946, *16834*. Recorded also from Uganda and Tanganyika Territory.

Asplenium monanthes L. Mant. 130. 1767.

A. monanthemum Murray, Syst. Veg. ed. 14. 933. 1784.

North Nyasa District: Nyika Plateau, on ground in montane forest, 15–30 cm. high, 2250 m., Aug. 16, 1946, *17240A*. Mlanje District: Mlanje Mountain; Luchenya Plateau, terrestrial in deep forest shade, 25–40 cm. high, leaves very dark green, 1890 m., June 30, 1946, *16531*. Widely distributed from Madagascar, South and tropical Africa, to Madeira, tropical America, and the Hawaiian Islands. The pinnae are typically monosoral but are occasionally found with more than one sorus per pinna.

Asplenium obscurum Bl. Enum. Plant. Jav. 181. 1828.

Cholo District: Cholo Mountain, moist rocks in bed of a rain-forest stream, 30-60 cm. high, leaves fleshy, 1200 m., Sept. 23, 1946, *17754*. A tropical Asian species already recorded from the Mascarenes by Christensen. The only other specimen from the African mainland in the Kew Herbarium is also from Nyasaland, collected by A. Whyte on the Masuku (? Misuku) Plateau in North Nyasa District. The species differs from *A. unilaterale* Lam. by its larger size and greenish non-shiny stipes and rachises.

Asplenium ruwenzoriense Baker, Kew Bull. 1901: 137. 1901.

Kota-kota District: Nchisi Mountain, frequent on rocks in moist forest ravines, 80–120 cm. high, leaves numerous, arched and spreading, more or less fleshy, dark green, 1550 m., July 30, 1946, *17035*. Zomba District: Zomba Plateau, occasional in undergrowth of riverine rain-forest, 60–80 cm. high, rhizome erect, stipes of rachis more or less fleshy, 1400 m., May 28, 1946, *16054;* ibid., terrestrial in riverine rain-forest, not common, 1–1.5 m. high, leaves dark green, stipes and lower part of rachis blackish, rhizome erect, 1400 m., May 28, 1946, *16062.* Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in forest undergrowth, 1 m. high, leaves several, arched from an erect rhizome, stipe and rachis black, 1890 m., July 7, 1946, *16706;* ibid., sporadic on densely shaded forest floor, 1890 m., July 7, 1946, *16710.* Cholo District: Cholo Mountain, common in rain-forest undergrowth, more or less 1–1.2 m. high, leaves somewhat fleshy, 1200 m., Sept. 23, 1946, *17756.* The type of the species in the Kew Herbarium, *Scott-Elliot 7706,* collected on Mt. Ruwenzori, is poorly collected and dried and is without base. Examination of a confusing collection of specimens from Uganda to the Transvaal has led to a somewhat broad concept of the species.

Asplenium sandersoni Hook. Sp. Fil. 3: 147. 1860.

Zomba District: Zomba Plateau, epiphyte, massed on a tree in riverine rain-forest, 15–20 cm. high, leaves pendent, proliferous, 1400 m., May 28, 1946, *16056.* Cholo District: Cholo Mountain, gregarious low epiphyte, 1350 m., Sept. 20, 1946, *17674.* Tropical east Africa, S. Africa, and Mascarenes.

Asplenium sandersoni Hook forma. **vagans** (Bak.) Ballard, stat. nov.

A. vagans Bak. in Hook. & Bak. Syn. Fil. 195. 1867.

Kota-kota District: Nchisi Mountain, tufted on rocks in rain-forest, gregarious, 10 cm. high, 1500 m., July 28, 1946, *17002;* ibid., low epiphyte, gregarious in rain-forest, 1650 m., July 31, 1946, *17065.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common epiphyte in deep forest shade, 10–15 cm. high, leaves more or less fleshy, spreading, proliferous, 1890 m., June 30, 1946, *16533.* Distribution probably as the type. The extreme state with small subflabellate pinnae, as in the Kew material of *17065,* looks very distinct, but intermediates between this and typical *A. sandersoni* are common.

Asplenium thunbergii Kunze, Linnaea 10: 517. 1836.

Asplenium auriculatum (Thunb.) Kuhn, Fil. Afr. 97. 1868. Non Sw. nec Mett.

Kota-kota District: Nchisi Mountain, terrestrial in rain-forest gullies, 40–60 cm. high, some leaves proliferous, 1500 m., July 28, 1946, *17007.* Zomba District: Zomba Plateau, occasional on rocks in riverine rain-forest, 25–35 cm. high, leaves arched, more or less fleshy, 1400 m., May 28, 1946, *16059.* Cholo District: Cholo Mountain, covering rocks in open parts of primary rain-forest, c.40 cm. high, 1400 m., Sept. 20, 1946, *17659;* ibid., occasional ground fern in rain-forest, 40–50 cm. high, 1300 m., Sept. 20, 1946, *17678;* ibid., on moist rocks in a rain-forest gulley, 1200 m., Sept. 23, 1946, *17762.* Also in Rhodesia and S. Africa. Frequently proliferous.

Asplenium unilaterale Lam. Encyc. 2: 305. 1786.

Cholo District: Cholo Mountain, gregarious on moist rocks in a rain-forest gulley, 20–30 cm. high, 1200 m., Sept. 23, 1946, *17765.* Throughout tropical Africa; also in Asia and Oceania.

Loxoscaphe nigrescens Moore, Ind. Fil. 297. 1861.

Davallia nigrescens Hook. Sec. Cent. Ferns *pl.* 93. 1861. Non *D. nigrescens* Kunze.
Asplenium hypomelas Kuhn, Fil. Afr. 104. 1868.
A. hollandii (Sim) C. Chr. Ind. Fil. Suppl. 1: 11. 1913.

North Nyasa District: Nyika Plateau, epiphytic on stems of tree-ferns in montane forest, 70–100 cm. high, rhizome straight, simple, 30–40 cm. long, closely appressed to stem of tree-ferns, leaves spreading, 2250 m., Aug. 16, 1946, *17274.* Tropical and South Africa.

L. nigrescens Moore should be treated as a "new name" for *Davallia nigrescens* Hook. and not a "new combination" since the epithet "nigrescens" was employed by Hooker in an illegitimate combination.

Loxoscaphe theciferum (H.B.K.) Moore var. **concinna** (Schrad.) C. Chr. Dansk Bot. Ark. 7: 104. 1932.

North Nyasa District: Nyika Plateau, upper branches of trees in juniper forest, 2250 m., Aug. 11, 1946, *17155**. Zomba District: Zomba Plateau, epiphytic on a tree overhanging stream, 30 cm. high, leaves pale green, fleshy, 1400 m., May 28, 1946, *16048*. Cholo District: Cholo Mountain, upper branches of rain-forest canopy trees, 1300 m., Sept. 24, 1946, *17783*. Tropical and South Africa, Mascarenes. Typical *L. thecifera* is found in tropical America.

POLYPODIACEAE

Polypodium excavatum Bory ex Willd. Sp. Pl. 5: 158. 1810.

Pleopeltis excavata (Bory ex Willd.) Moore, Ind. Fil. 347. 1862.
Lepisorus excavatus (Bory ex Willd.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 4: 68. 1933.

Zomba District: Zomba Plateau, occasional on trunks of trees in riverine rain-forest, rhizome creeping, leaves few, pale, more or less fleshy, 1400 m., May 28, 1946, *16060*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common epiphyte in rain-forest, leaves usually with undulate margins, 1400 m., May 28, 1946, *16437*. Common. Tropical and South Africa, Mascarenes, with related forms in Asia.

Polypodium lanceolatum L. Sp. Pl. 1082. 1753.

Pleopeltis lanceolata (L.) Kaulf. Enum. Fil. 245. 1824.

North Nyasa District: Nyika Plateau, upper branches of trees in juniper forest, 2250 m., Aug. 11, 1946, *17156**; ibid., mossy branches of shrubs on banks of a grassland stream, leaves coriaceous, 2300 m., Aug. 14, 1946, *17227*. Kota-kota District: Nchisi Mountain, on dry rocks in *Brachystegia* woodland, leaves yellowish, 1600 m., July 31, 1946, *17057*. Zomba District: Zomba Plateau, creeping on exposed trunks of rain-forest trees, 10–15 cm. high, leaves stiff fleshy, much paler below than above, 1770 m., May 31, 1946, *16119A*. Mlanje District: Mlanje Mountain, common low epiphyte in forest, 15–25 cm. high, 1820 m., July 5, 1946, *16678*. Tropical and South Africa, Mascarenes, with related forms in tropical America, India, Hawaii, etc.

Polypodium oosorum Bak. in Henriq. Bol. Soc. Brot. 4: 154, 1887.

Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic near ground in primary forest, 1890 m., July 12, 1946, *16811*; ibid., locally gregarious on shaded mossy rocks in stream bed, 2–4 cm. high, 1820 m., July 5, 1946, *16670*. San Thomé, Cameroons, Madagascar.

Polypodium rigescens Bory ex Willd. Sp. Pl. 5: 183. 1810.

North Nyasa District: Nyika Plateau, epiphytic in an exposed situation, 2300 m., Aug. 14, 1946, *17228**; ibid., epiphytic in montane forest, 15–25 cm. high, 2250 m., Aug. 16, 1946, *17242*; ibid., 2350 m., Aug. 17, 1946, *17284*; ibid., 2350 m., Aug. 18, 1946, *17326**. Mlanje District: Mlanje Mountain; Luchenya Plateau, in mass on a shaded rock face on grassland, 5–8 cm. high, rhizome shortly creeping, 2200 m., July 3, 1946, *16655*. Tropical Africa, Rèunion, tropical America.

Polypodium villosissimum Hook. Sp. Fil. 4: 197. 1862.

Mlanje District: Mlanje Mountain; Luchenya Plateau, scattered tufts on mossy upper branches of a *Widdringtonia* tree, 5–10 cm. high, 1890 m., June 30, 1946, *16549*. Sierra Leone, Fernando Po, San Thomé. The only other tropical East African specimen seen is *Stolz 883* from Kyimbila District.

Loxogramme lanceolata (Sw.) Pr. Tent. Pterid. 215. 1836.
Polypodium loxogramme Mett. Polypodium 112. 1857.

North Nyasa District: Nyika Plateau, terrestrial, in montane forest, 2250 m., Aug. 16, 1946, *17241**; ibid., epiphytic in montane forest, rare, 2350 m., Aug. 17, 1946, *17287*. Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in primary forest, leaves pendent, fleshy, 1890 m., July 12, 1946, *16805*; ibid., epiphytic in deep forest shade, 1890 m., June 30, 1946, *16532*. Cholo District: Cholo Mountain, gregarious on mossy lower trunks of rain-forest trees, 1400 m., Sept. 20, 1946, *17665*. Tropical and South Africa and Mascarenes. Some Asiatic forms appear to be closely allied.

VITTARIACEAE

Vittaria isoetifolia Bory, Voy. Afr. 2: 325. 1804.

Mlanje District: Mlanje Mountain; Luchenya Plateau, several tufts on mossy trunks of rain-forest trees, leaves pendent, 1750 m., June 24, 1946, *16414*; ibid., frequent epiphyte in forest, leaves dark green, 70–90 cm. long, numerous, pendent, 1890 m., June 30, 1946, *16529*. Tropical and South Africa and Mascarenes.

Vittaria volkensii Hieron. Bot. Jahrb. 53: 428. 1915.

Cholo District: Cholo Mountain, epiphytic, high on rain-forest trees, leaves pendent, channelled, stiff, 1350 m., Sept. 20, 1946, *17672*. Tropical east Africa.

LYCOPODIACEAE

Lycopodium carolinianum L. var. **tuberosum** (A. Br. & Welw. ex Kuhn) Nessel, Bärl. 274. 1939; F. Ballard, Am. Fern Jour. 40: 74. 1950.

Zomba District: Zomba Plateau, 1700 m., May 31, 1946, *16113**. Mlanje District: Mlanje Mountain; Luchenya Plateau, local on open boggy slopes, 10–15 cm. high, prostrate and shortly creeping, 2100 m., June 27, 1946, *16468*. Tropical Africa. *16468* shows presence of tubers and is more robust than the average. Nessel would probably include it in "var. Welwitschii Hert." The species as usually considered is almost certainly an aggregate and is spread over most temperate and tropical regions.

Lycopodium cernuum L. Sp. Pl. 1103. 1753.

North Nyasa District: Nchena-chena, on wet ground in *Brachystegia* woodland, 40–100 cm. high, 1340 m., Aug. 21, 1946, *17373*. Tropics and subtropics in old and new worlds. A very common species.

Lycopodium clavatum L. Sp. Pl. 1101. 1753.

Mlanje District: Mlanje Mountain; Luchenya Plateau, forming dense tangled pale green beds, abundant locally on grassy edges of forest, 2100 m., June 27, 1946, *16482*. A common world species, restricted in the tropics to high altitudes. It is undoubtedly a composite species. The British form has a chromosome number of n = 34 (Manton, l.c. 247).

Lycopodium dacrydioides Bak. Handb. Fern Allies 17. 1887.
Urostachys dacrydioides (Bak.) Hert. ex Nessel, Bärl. 188. 1939.

Mlanje District: Mlanje Mountain; Luchenya Plateau, epiphytic in forest, stems pendent, up to 1 m. long, many in a clump, 1880 m., June 28, 1946, *H.E. Anthony 16527*. Cholo District: Cholo Mountain, pendent, one small clump on an exposed rock in rain-forest, 1400 m., Sept. 20, 1946, *17667*. Tropical and South Africa.

Lycopodium ophioglossoides Lam. Encyc. 3: 646. 1791.
Urostachys ophioglossoides (Lam.) Hert. ex Nessel, Bärl. 238. 1939.

Mlanje District: Mlanje Mountain; Luchenya Plateau; on mossy trunks of trees along a stream, clumps small, branches pendent, 1750 m., June 25, 1946, *16417*. Tropical Africa, Mascarenes.

Lycopodium verticillatum L.f. Suppl. 448. 1781.

Urostachys verticillatus (L. f.) Hert. Bot. Centr. Beih. 39^2: 249. 1922.

Zomba District: Zomba Plateau, several clumps on branches of a rain-forest tree, 1500 m., June 7, 1946, *16307*. Mlanje District: Mlanje Mountain; Luchenya Plateau, pendent from a tree in primary forest, 1890 m., July 13, 1946, *16821*. Pantropical.

SELAGINELLACEAE

Selaginella abyssinica Spring, Mém. Acad. Belg. 24^{44}: 99. 1850.

Zomba District: Zomba Plateau, massed in moist shade on an exposed rocky bluff, more or less 20 cm. high, habit erect, rhizome thick and fleshy, 1500 m., June 2, 1946, *16159*. Widely spread in tropical Africa from Abyssinia to Rhodesia.

Selaginella kraussiana (Kunze) A. Br. Ind. Sem. Hort. Berol. 1860: App. 22. 1860.

Mlanje District: Mlanje Mountain; Luchenya Plateau, gregarious and often completely covering the ground in old secondary forest especially in association with bamboo, more or less 30 cm. high, ascending, fleshy, sterile, 1800 m., July 8, 1946, *16730*. A common species throughout tropical east Africa and South Africa; recorded also for Cameroon Mountain and the Azores.

Selaginella mittenii Bak. Jour. Bot. 21: 81. 1883.

Mlanje District: Mlanje Mountain; Likubula Gorge, abundant on shaded mossy rocks on bank of river, creeping and molted [matted?], 840 m., June 20, 1946, *16372*. Angola, Rhodesia, Tanganyika Territory, and South Africa.

GYMNOSPERMAE

PODOCARPACEAE

Podocarpus milanjianus Rendle, Trans. Linn. Soc. Bot. II. 4: 61. 1894; Stapf in Prain, Fl. Trop. Afr. 6^2: 340. 1917; Chalk, Burtt Davy & Desch, For. Trees & Timbers Brit. Emp. 1: 20–26. 1932.

Zomba District: Zomba Plateau, in rain-forest, apparently rare, tree 10 m. high, branches and branchlets stiff, erect, flowers [♂ catkins] pink, 1700 m., May 31, 1946, *16109**; ibid., occasional in riverine rain-forest, ♀ tree 8 m. high and 15 cm. in diameter at breast-height, fruit young, 1450 m., June 3, 1946, *16183;* ibid., 1500 m., June 2, 1946, *16156A*. Mlanje District: Mlanje Mountain; Luchenya Plateau, a major canopy tree of the plateau forest, tree up to about 25 m. high and up to 1 m. in diameter at breast-height, young leaves yellow, conspicuous, 1890 m., July 2, 1946, *16607*. North Nyasa District: Nyika Plateau, frequent canopy tree in montane forest, tree about 10 m. high and 35 cm. in diameter, leaves stiff, much recurved, ripe receptacles orange, very fleshy, 2300 m., Aug. 13, 1946, *17208;* ibid., one of the chief dominants in montane forest, tree up to 15 m. tall and 0.5 m. in diameter, fruit unripe, 2250 m., Aug. 16, 1946, *17254*. Anglo-Egyptian Sudan (Imatong Mts.), Uganda, Kenya, Tanganyika Territory, Belgian Congo, Nyasaland, N. and S. Rhodesia, and Angola (Benguela Plateau).

CUPRESSACEAE

Widdringtonia whytei Rendle, Trans. Linn. Soc. Bot. II. 4: 60. *pl. 9, f. 6–11.* 1894; Stapf in Prain, Fl. Trop. Afr. 6^2: 334. 1917; Stapf in Hill, Fl. Cap. 5^2: suppl. 17. 1933.

Mlanje District: Mlanje Mountain, south-west ridge, juvenile foliage of *16513*, leaves glaucous beneath, 2400 m., June 28, 1946, *16514;* Luchenya Plateau, local in small pure scrubby stands on slopes not too steep to support the larger local form of the species, tree 5–10 m. high, branches short, upturned to upright, 1800 m., July 5, 1946, *16668;* ibid., often the dominant tree of remnant strips of primary forest in gullies and ravines, tree 30 m. or more high, diameter at breast-height up to 2 m., bark fibrous, fissured into broad ridges very thick on old trees, wood termite-resistant and very durable, photos, 1890 m., July, 1946, *16718;* ibid., juvenile foliage, leaves glaucous above, more so beneath, 1890 m., July 7, 1946, *16719;* ibid., material from a young plantation tree about 10 m. high, the so-called "scaly form" of *W. whytei,* said never to have leaves of juvenile type even in the early stages of its growth, 1890 m., July 8, 1946, *16744;* ibid., abundant in primary forest, especially in gullies and ravines, tree up to about 30 m. high, material from a tree about 12 m. high and 35 cm. in diameter, which still had some juvenile leaves on 15 lower branches, 1890 m., July 14, 1946, *16838*. Nyasaland, S. Rhodesia, and the Transvaal.

Juniperus procera Hochst. ex Endl. Syn. Conif. 26. 1847; Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 278. 1850–1851; Stapf in Prain, Fl. Trop. Afr. 6^2: 336. 1917.

North Nyasa District: Nyika Plateau, dominant tree of a type of forest of which only small remnants survive, tree to 35 m. tall and 1.5 m. in diameter, bark fibrous, rather thin, wood reddish-brown, very fragrant, 2250 m., Aug. 11, 1946, *17159*. Eritrea, Abyssinia, Somaliland, Uganda, Kenya, Tanganyika Territory, and Nyasaland.

ANGIOSPERMAE

RANUNCULACEAE[6]

Clematis simensis Fresen. Mus. Senckenb. 2: 267. 1837.

Clematis sigensis Engl. Bot. Jahrb. 45: 271. 1910.
Clematis kissenyensis Engl. in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 1907–1908 2: 207. 1911.
Clematis altissima Hutch. Kew Bull. 1923: 180. 1923.

Zomba District: Zomba Plateau, climbing to 5 m. in riparian rain-forest, vine, leaves more or less rugose, dull pale green, 1700 m., May 31, 1946, *16106*. Mlanje District: Mlanje Mountain, on west slope, common in bushy second-growth forest, vine 2–4 m. high, 1650 m., July 18, 1946, *16860*. Eritrea to S. Rhodesia, Belgian Congo, Angola, Cameroon Mt., and Fernando Po.

Clematis hirsuta Perr. & Guill. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 1: 1. 1831.

Clematis glaucescens Fresen. Mus. Senckenb. 2: 268. 1837.
[*Clematis inciso-dentata* A. Rich. Tent. Fl. Abyss. 1: 2. 1847.
Clematis grata (non. Wall.) Oliv. Fl. Trop. Afr. 1: 7. 1868.]
Clematis petersiana Klotzsch in Peters, Reise Mossamb. Bot. 1: 170. 1861.

Kota-kota District: Nchisi Mountain, scrambling in bushy second growths, vine 2 m. high, leaves grey below, sepals cream, stamens yellow, 1350 m., Aug. 3, 1946, *17112;* ibid., common in second-growth forest, vine 2–4 m., flowers greenish, 1100 m., Aug. 3, 1946, *17119*. Widely spread in tropical Africa from Senegal and Eritrea to Angola and Mozambique.

These two gatherings of this very polymorphic species represent different forms. *Brass 17112* has the indumentum of the leaves more dense and the flowers larger than *17119*. It has not been found possible to subdivide the species into easily recognizable taxa, as it is hard to find two gatherings in which all the characters agree.

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[6] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

Clematis sp.

Mlanje District: Mlanje Mountain; Luchenya Plateau, one example in bushy second-growth forest, vine 3 m. high, 1890 m., July 14, 1946, *16836*.

The above specimen is too poor for certain determination. It suggests *C. commutata* Kuntze, a species known from Iringa in southern Tanganyika, but the leaflets are larger and more glabrous than any specimens which I have seen of that species. Alternatively it might be a hybrid between *C. hirsuta* Guill. & Perr. and *C. simensis* Fresen., but if that is so, it is strange that Mr. Brass did not collect specimens of *C. hirsuta* from Mt. Mlanje. It is hoped that further collection from the Luchenya Plateau may reveal the identity of this interesting but imperfect gathering.

Clematis sp.

Zomba District: Zomba Plateau, 1500 m., June 6, 1946, *16278*.

This gathering consists only of leaves, which are infected by *Aecidium englerianum* P. Henn. It most probably is a form of *Clematis hirsuta* Guill. & Perr.

Clematopsis scabiosifolia (DC.) Hutch. Kew Bull. **1920**: 20. 1920; Exell, Léonard & Milne-Redhead, Bull. Soc. Roy. Bot. Belge **83**: 402. 1951.

Clematis scabiosaefolia DC. Syst. **1**: 154. 1818.
Clematis kirkii Oliv. Fl. Trop. Afr. **1**: 5. 1868.
Clematis stuhlmannii Hieron. in Engl. Pflanzenw. Ost-Afr. C: 180. 1895.
Clematis lugnignu De Wild. Repert. Sp. Nov. 13: 200. 1914.
Clematopsis kirkii (Oliv.) Hutch. Kew Bull. 1920: 17. 1920.
Clematopsis stuhlmannii (Hieron.) Hutch. Kew Bull. 1920: 20. 1920.

Kota-kota District: Nchisi, occasional in *Brachystegia* woodlands, shrub about 1 m. tall, stems erect, 1300 m., Aug. 2, 1946, *17104**. Kasungu District: Kasungu, in old garden lands, not common, shrub about 1 m. high, flowers pinkish-white, 1000 m., Aug. 27, 1946, *17435*. Nigeria and Cameroons, A.-E. Sudan, Uganda, and western Kenya, south to the Transvaal and Angola.

Both these specimens of *Clematopsis* fall within the aggregate species, *C. scabiosifolia* (DC.) Hutch. as defined by Exell, Léonard and Milne-Redhead (l.c.). *Brass 17104* is fairly typical of their Group B, and might well have been placed in *Clematis lugnignu* De Wild. by a botanist taking the narrow view of *Clematopsis* species. *Brass 17435* is quite a different plant, and falls into the transition between Groups C and F in the above-mentioned paper. It might be described as a good intermediate between *Clematopsis kirkii* (Oliv.) Hutch. and *C. stuhlmannii* (Hieron.) Hutch. This latter gathering is in unripe fruit; it seems that the collectors' colour note must refer to the plumose styles.

Knowltonia transvaalensis Szyszyl. Polypet. Thalam. Rehm. 99. 1887.

Anemone whyteana Bak. f. Trans. Linn. Soc. II. Bot. **4**: 4. 1894.
Anemone peneënsis Bak. f. Jour. Linn. Soc. Bot. 40: 16. 1911.
Anemone transvaalensis (Szyszyl.)Burtt-Davy, Ann. Transv. Mus. **3**: 121. 1912.
Knowltonia whytei Engl. Pflanzenw. Afr. 3^1: 170. 1915, in obs.; sphalm. pro *K. whyteana* (Bak.f.)Engl.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common under cover of bracken *(Pteridium)* on grasslands, herb, flower-stems appear after burning of the sheltering bracken, flower involucre [tepals] cream-coloured tinged with purple, 2000 m., July 18, 1946, *16870*. Southern Tanganyika through Nyasaland and S. Rhodesia to the Transvaal.

Knowltonia Salisb. differs from *Anemone* L. in that the fruits are fleshy drupelets, the whole fruiting head resembling the fruit of a species of *Rubus*. Although *K. transvaalensis* has been gathered on more than a score of occasions, it has not, so far as I am aware, ever been collected in fruit. This may be due to a number of causes, among which are the reluctance of collectors to press such fleshy fruits and the probable attraction they offer to fruit-eating birds. The species is, however, so strikingly similar to certain species of *Knowltonia* that I have no hesitation in placing it in that genus, which, apart from *K. transvaalensis*, is confined to South Africa.

Thalictrum rhynchocarpum Q. Dill. & A. Rich. Ann. Sci. Nat. II. 14: 262. 1840.
Thalictrum mannii Hutch. Kew Bull. 1927: 154. 1927.
Thalictrum chapinii B. Boiv. Rhodora 46: 395. 1944, pro parte, quoad typum.
Thalictrum impexum B. Boiv. Rhodora 46: 395. 1944.
Thalictrum innitens B. Boiv. Rhodora 46: 394. 1944.

Zomba District: Zomba Plateau, occasional in grassy edges of rain-forest, herb scrambling to a height of about 1.5 m., 1450 m., June 3, 1946, *16192*. North Nyasa District: Nyika Plateau, apparently rare, open places in montane forest, about 1 m. high, 2350 m., Aug. 17, 1946, *17281*. Cameroon Mt., mountains and highlands of eastern Africa from Abyssinia and A.-E. Sudan to the Cape Province of South Africa.

Ranunculus multifidus Forsk. Fl. Aegypt.-Arab. 102. 1775.
Ranunculus pubescens Thunb. Prodr. Pl. Cap. 94. 1800.
Ranunculus forskoehlii DC. Syst. 1: 303. 1817–1818.
[*Ranunculus pinnatus* (non Poir.) Oliv. Fl. Trop. Afr. 1: 9. 1868.]

Cholo District: Cholo Mountain, frequent in marshy bottoms of gullies, herb 80–100 cm. high, flowers yellow, 1200 m., Sept. 28, 1946, *17853*. Arabia and Abyssinia, south to the Cape Province of South Africa and west of Nigeria and Angola.

Delphinium leroyi Franch. ex Huth, Bot. Jahrb. 20: 474. 1895.
Delphinium candidum Hemsl. Bot. Mag. *pl. 8170*. 1907.

North Nyasa District: Nyika Plateau, one plant found in open grassland, herb, flowers white with purplish tinge, 2440 m., Aug. 11, 1946, *17172**; ibid., occasional on edges of grassland paths, perennial herb 50–70 cm. tall, flowers purplish white, 2350 m., Aug. 16, 1946, *17269*. Southern A.-E. Sudan (Imatong Mts.), eastern Uganda (Mt. Elgon), mountains and highlands of Tanganyika to Nyasaland.

D. leroyi had not been recorded from Nyasaland until found there by Mr. Brass. A further gathering has recently been received at Kew from Mr. P. O. Wiehe, who states that it is locally common in grasslands on the Nyika Plateau. *D. leroyi* has an interesting distribution in eastern Africa, being absent from Abyssinia and the Kenya highlands.

Delphinium dasycaulon Fresen. Mus. Senckenb. 2: 272. 1837.

Kota-kota District: Nchisi Mountain, one example in a gully in *Brachystegia* woodland, perennial herb 1.5 m. high, flowers blue, 1400 m., July 27, 1946, *16990**. North Nyasa District: Nyika Plateau; Nchena-chena Spur, common on grassy slopes, perennial herb, 80–100 cm. tall, flowers bright blue, showy, 1700 m., Aug. 10, 1946, *17150*. A.-E. Sudan, Eritrea and Abyssinia, Cameroons and Nyasaland, N. Rhodesia, and Belgian Congo.

D. dasycaulon affords an excellent example of discontinuous distribution in tropical Africa. As will be seen by the accompanying map, it is known at present from three quite distinct regions although conditions which one would expect to

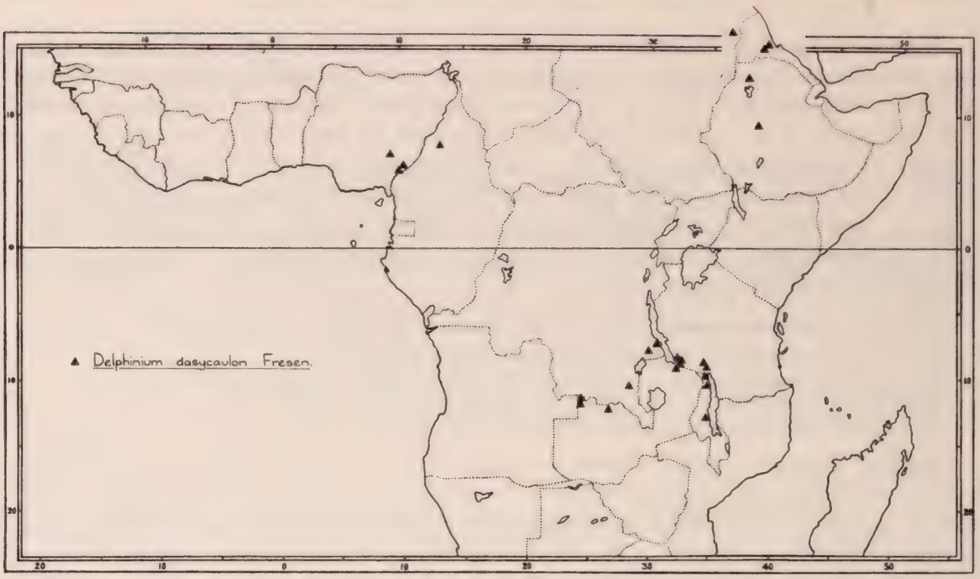

FIG. 2. Distribution of *Delphinium dasycaulon.*

be suitable occur over a wide area of the savannah regions of Africa. It is a particularly good example because, having conspicuous and attractive flowers, it is unlikely to have been overlooked by collectors to any great extent. *D. dasycaulon* reaches its southeastern limit in Nyasaland.

ANNONACEAE

Artabotrys cf. **monteiroae** Oliv. Hook. Ic. Pl. *pl. 1796.* 1888.

Kota-kota District: Nchisi Mountain, amongst rocks in *Brachystegia* woodland, tree or shrub 4 m. high, fruits green, 1400 m., July 24, 1946, *16897.*

A. monteiroae has been recorded previously from Portuguese East Africa, Natal, and Transvaal. Flowers are desirable before Mr. Brass' plant is named more definitely. *Hutchinson & Gillett 3770 A* from Kaloswe, N. Rhodesia, and *Greenway & Trapnell 5770* from N. of Shiwa Ngandu, N. Rhodesia, both in Herb. Kew., appear to be the same, and both are only in fruit.

Hexalobus monopetalus (A. Rich.) Engl. & Diels, Monogr. Afr. Pfl.-Fam. & Gatt. 6: 56 (1901) var. **obovatus** Brenan, var. nov.

Foliis late plus minusve obovatis, ad apicem rotundato-emarginatis, costa subtus strigillosa vel pubescenti sed non tomentella differt.

TANGANYIKA TERRITORY: Lake Province, Mwanza District: between Iwondo and Karumo in Uzinza west of Mwanza, local in *Isoberlinia* woodland, a tree 4.5 m. high, 1190 m., Mar. 31, 1937, *B. D. Burtt 6530* (Herb. Kew.). Western Province, Tabora District: Kakoma and Tabora, eluvium and interzones, shrub to small tree, not very common, 1070–1220 m., Apr. 1935, *H. A. Lindeman 73* (Herb. Brit. Mus.). Native name mkuwa.

NYASALAND: Kota-kota District: Chia area, in sandy woodlands of lake plain, tree 4–5 m. high, flowers cream, 480 m., Sept. 1, 1946, *17478.*

S. RHODESIA: Salisbury District: Salisbury, small tree, 1340 m., Mar. 30, 1929, *Eyles 6317* (Herb. Kew.). Hartley District: Hartley, rare tree in rocky places, 1220 m., June, 1930, *Eyles 6398* (Herb. Kew.). Gatooma, 1070 m., Apr., *Eyles 7051* (Herb. Kew.).

N. RHODESIA: Mwinilunga District: Slope E. of Matonchi Farm, on rocky kopje in open, slender bushy tree 3.6–4.5 m. high, leaves bright green, unripe fruits green, red when ripe, with red flesh inside, native name (Chilunda) karendesa, Feb. 12, 1938, *E.*

Milne-Redhead 4536 (TYPUS varietatis in Herb. Kew.). Solwezi District: Mutanda Bridge, in *Brachystegia* woodland, shrub 2.4 m. high, buds on older shoots, native name (Chikaonde) kanpo, June 21, 1930, *E. Milne-Redhead 557* (Herb. Kew.). Ndola District: Ndola, 1935, *C. E. Duff 203* (Herb. Kew.).

Duff 203 has the leaves broad, but rather less obovate and more oblong, thus approaching typical *H. monopetalus.*

It becomes rather a matter of choice whether the above new variety is described under *H. monopetalus* or *H. glabrescens* Hutch. et Dalz. The characters of the latter, however, do not convince me as specific, and I prefer to treat *H. monopetalus* in a wide sense.

H. monopetalus is very variable in its foliage and indumentum, but var. *obovatus* seems to be a relatively distinct race, predominantly in south tropical Africa, distinguished by its broad obovate leaves. The midrib beneath is finely strigose to pubescent, but apparently never tomentellous as in typical *H. monopetalus.*

MENISPERMACEAE[7]

Cocculus hirsutus (L.) Diels, Pflanzenreich 46 (4^{94}): 236. 1910.

Menispermum hirsutum L. Sp. Pl. 341. 1753.

Cebatha hirsuta (L.) Kuntze, Rev. Gen. Pl. 1: 9. 1891.

Kota-kota District: Chia area, frequent on termite-mounds in dry woodlands of lake-plain, vine 5–8 m. high, flowers green, native name (Chinyanja) Nangunega, 480 m., Sept. 7, 1946, *17562*. Chikwawa District: Chikwawa, occasional in dry bushy forest, vine 5–8 m. high, flowers green, 200 m., Oct. 2, 1946, *17901*. Widely spread through tropical Africa, also in Arabia and India.

Stephania abyssinica (Dill. & A. Rich.) Walp. Repert. 1: 96. 1842.

Clypea abyssinica Dill. & A. Rich. Ann. Sci. Nat. II. 14: 263. 1840.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in bushy forest second growth, vine sprawling over the ground or climbing to a height of 2 m., flowers red, fruits pink, 1890 m., July 14, 1946, *16835*. Widely spread throughout tropical Africa.

Cissampelos mucronata A. Rich. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 1: 11. 1831.

Chikwawa District: Lower Mwanza River, occasional on sandy river-banks, vine 2–3 m. high, fruit globose, soft and fleshy, native name (Chinyanja) chilambe, 180 m., Oct. 6, 1946, *17997;* ibid., trailing on sandy beach, vine, flowers green, 180 m., Oct. 6, 1946, *18011*. Widely spread throughout tropical and subtropical Africa.

BERBERIDACEAE[8]

Berberis holstii Engl. Pflanzenw. Ost-Afr. C: 181. 1895.

Berberis petitiana C. K. Schn. Bull. Herb. Boiss. II. 5: 455. 1905.

North Nyasa District: Nyika Plateau, common in grassland shrubberies, shrub 1–1.5 m. high, sterile, leaves glaucous below, petioles red, 2500 m., Aug. 18, 1946, *17325*. Highlands from Abyssinia to Nyasaland.

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[7] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

[8] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

In considering *B. petitiana* C. K. Schn. to be conspecific with *B. holstii* Engl., I am following R. E. Fries (Notizbl. Bot. Gart. Berl. 9: 319. 1925), who, however, used the later name for the species. Although Mr. Brass' material is sterile, there can be little doubt that it is this species. This Nyasaland record is of interest as hitherto the plant was not known to occur south of Dobega in the Iringa District of Tanganyika.

NYMPHAEACEAE[9]

Nymphaea lotus L. Sp. Pl. 1: 511. 1753.

Chikwawa District: Lower Mwanza River, frequent in muddy pools, herb, flowers white, 180 m., Oct. 4, 1946, *17960*. Egypt, tropical Africa generally, and Madagascar.

Nymphaea caerulea Savigny, Décade Égyptienne 1: 74. 1798.

[*Nymphaea stellata* (non Willd.) Oliv. Fl. Trop. Afr. 1: 52. 1868.]

Nymphaea calliantha Conard, Ann. Cons. Jard. Bot. Genève 7–8: 19. 1903.

Kota-kota District: Kota-kota, flowers blue, 450 m., Aug., 1946, *Vernay 17401**. Chia area, in open lagoons, leaves brownish-green above, purple below, sepals green, petals lilac, stamens pale yellow with lilac apex, 480 m., Sept. 1, 1946, *17465;* ibid., common in small water-holes on dry lake-plain, flowers pale blue, 480 m., Sept. 5, 1946, *17544*. Widely spread through tropical Africa; also in Egypt.

In placing these Nyasaland gatherings under *N. caerulea,* I am taking a broad view of the species, similar to that taken by Exell and Mendonça in Carrisso, Consp. Fl. Angol. 1: 46 (1937).

CAPPARIDACEAE[10]

Capparis tomentosa Lam. Encyc. 1: 606. 1785.

Kota-kota District: Chia area, frequent in second growth rain-forest on banks of streams, vine 10–20 m. high, petals pale green, filaments pale pink, 480 m., Sept. 4, 1946, *17523*. Widely spread in tropical Africa.

Capparis rosea (Klotzsch) Oliv. Fl. Trop. Afr. 1: 99. 1868.

Petersia rosea Klotzsch in Peters, Reise Mossamb. Bot. 168. *pl. 30.* 1862.

Chikwawa District: Chikwawa, common in dry bushy forest of elevated alluvial plain, shrub 2–3 m. high, flowers greenish-white, 200 m., Oct. 2, 1946, *17895;* ibid., common in dry bushy forest of elevated river-plain, shrub 1.5–2 m. high, flowers greenish-white, 200 m., Oct. 3, 1946, *17910*. Nyasaland and Portuguese East Africa.

Cadaba kirkii Oliv. Fl. Trop. Afr. 1: 90. 1868.

Mombera District: 30 miles S. of Njakwa, on termite-mounds in *Brachystegia* woodland, shrub 3–4 m. high, leaves more or less fleshy, flowers yellowish-green, 1200 m., Aug. 9, 1946, *17142*. Kota-kota District: Chia area, frequent on termite-mounds in woodlands of lake-plain, shrub 2–3 m. high, inflorescence viscid, flowers green, 480 m., Sept. 2, 1946, *17502*. Chikwawa District: Chikwawa, occasional in dry bushy forest on elevated alluvial plain, shrub 1.5–2 m. high, upper leaves and inflorescence viscid, flowers yellowish-green, fruit immature, native name (Chinyanja) nswadji, 200 m., Oct. 2, 1946, *17889*. Central Tanganyika, eastern N. Rhodesia, Nyasaland, and S. Rhodesia.

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[9] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

[10] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

Boscia corymbosa Gilg in Engl. Pflanzenw. Ost-Afr. C: 189. 1895.

Kasungu District: Kasungu Hill, occasional on dry rocky slopes, vase-shaped tree, 6–7 m. high, branches suberect, flowers yellow-green, fruit green, 1100 m., Aug. 28, 1946, *17457*. Nyasaland and Portuguese East Africa.

Boscia salicifolia Oliv. Fl. Trop. Afr. 1: 93. 1868.

Chikwawa District: Chikwawa, occasional on river-plains, tree to 15 m. high, trunk up to 40 cm. diameter, branchlets pendent, fruit unripe, native name (Chinyanja) mbwazi, 200 m., Oct. 4, 1946, *17941*. Widely spread from the Gold Coast east to the A.-E. Sudan and south to S. Rhodesia.

Maerua flagellaris (Oliv.) Gilg & Benedict, Bot. Jahrb. 53: 244. 1915.

Maerua nervosa (Hochst.) Oliv. var. *flagellaris* Oliv. Fl. Trop. Afr. 1: 87. 1868.

Kasungu District: Kasungu, frequent in *Brachystegia* woodland, vine 6–10 m., profusely branched and forming large green masses on trees, flowers green, native name (Chinyanja) nangunega, 1000 m., Aug. 25, 1946, *17420;* ibid., common in *Acacia-Bauhinia* savanna, shrub 1 m. high, straggling, sepals and petals green, filaments yellowish-white, 1000 m., Aug. 28, 1946, *17450*. Chikwawa District: Chikwawa, occasional in *Acacia* woodland, vine 10–15 m. high, flowers greenish-white, fruit immature, 200 m., Oct. 3, 1946, *17911*. Tanganyika to S. Rhodesia.

Maerua angolensis DC. Prodr. 1: 254. 1824.

Kota-kota District: Kota-kota, on old cultivated land, tree about 8 m. high, flowers green, stamens yellow, 450 m., Aug. 7, 1946, *G. C. Shortridge 17390*. Kasungu District: Kasungu, one example on old garden land, tree 4 m. high, sepals green, stamens greenish-white, later yellow, 1000 m., Aug. 27, 1946, *17440*. Widely spread in the savannah regions of tropical Africa.

Maerua sp.

Mlanje District: Likubula Gorge, on a termite-mound in *Brachystegia-Uapaca* woodland, shrub 5 m. high, subscandent, fruit green, somewhat fleshy and mucilaginous, 840 m., June 20, 1946, *16378*.

This specimen belongs to a small group of species including *M. cylindricarpa* Gilg & Benedict, *M. hoehnelii* Schweinf. ex Engl., and *M. pubescens* (Klotzsch) Gilg, the taxonomy of which has not yet been satisfactorily worked out. More field observation is required in order to assess the value of the degree of indumentum and length of pedicel for diagnostic purposes.

Courbonia glauca (Klotzsch) Gilg & Benedict, Bot. Jahrb. 53: 221. 1915.

Physanthemum glaucum Klotzsch in Peters, Reise Mossamb. Bot. 167. *pl. 29*. 1862.
Courbonia camporum Gilg & Benedict, Bot. Jahrb. 53: 220. 1915.
Courbonia calothamna Gilg & Benedict, Bot. Jahrb. 53: 221. 1915.

Chikwawa District: Chikwawa, frequent in dry bushy forest of elevated river-plain, shrub 1 m. high, spreading, leaves very glaucous, flowers greenish-white, native name (Chinyanja) kungoni, 200 m., Oct. 2, 1946, *17890*. Widely spread from Kenya and Uganda to Portuguese East Africa and the Transvaal.

I am unable to separate these three species, as I find the diagnostic characters given by Gilg and Benedict are unsound. The young leaves which are present at the time of flowering look very different from the mature leaves found on fruiting specimens. It seems that the plant may flower on shoots arising directly from the rootstock as a result of the burning off of the previous year's growth, or if protected from fire it may form a densely branched shrub several meters high. I have not been able to examine authentic material of *C. decumbens* A. Brongn., but I would not be surprised to find that Oliver was correct in placing *Physanthemum glaucum* Klotzsch as a synonym of that name, which was published two years earlier than Klotzsch's species. If these species are found to be conspecific, the epithet *decumbens* would have to be used.

Thylachium africanum Lour. Fl. Cochinch. 418. 1790.

Chikwawa District: Chikwawa, common in dry bushy forest on elevated river-plain, tree or shrub 2–6 m. high, leaves 1–3-foliolate, flowers white, fruit immature, costate, 200 m., Oct. 2, 1946, *17891.* Eastern Africa from Kenya to S. Rhodesia and Portuguese East Africa.

Cleome densifolia C. H. Wright, Kew Bull. **1907**: 360. 1907.

Mlanje District: Mlanje Mountain; Likubula-Tuchila Divide, frequent in grassy edges of forest, shrub about 1–1.5 m. high, viscid, flowers pink, 2000 m., July 9, 1946, *16754.* Nyasaland.

Known previously from a single gathering made by Mr. J. M. Purves in September, 1901, on Tuchila Plateau.

Cleome sp.

Kasungu District: Kasungu, common in old gardens, herb about 1 m. high, viscid, foetid, flowers purple, 1000 m., Aug. 26, 1946, *17431.*

I have been unable to match this specimen with any *Cleome* at Kew. I am reluctant to describe it as new on a single gathering, as, being a weed of cultivation, it may well be an introduced species.

VIOLACEAE[11]

Rinorea burtt-davyi Dunkley, Kew Bull. **1937**: 466. 1937.

Cholo District: Cholo Mountain, characteristic undergrowth in primary rain-forest, attractive tree 3–7 m. high, flowering profusely, flowers white, fruit immature, 1300 m., Sept. 20, 1946, *17687.* Nyasaland.

Cholo Mountain is the type-locality of *R. burtt-davyi* Dunkley.

Viola abyssinica Steud. ex. Oliv. Fl. Trop. Afr. **1**: 105. 1868.

North Nyasa District: Nyika Plateau, common in ground cover of montane forest, stems creeping, flowers purple, 2400 m., Aug. 18, 1946, *17316;* ibid., scrambling in grassland shrubberies, herb, stems branched, to 1 m. long, flowers purple, 2500 m., Aug. 18, 1946, *17323.* East African Mountains from Abyssinia to S. Rhodesia, Cameroon Mt., and Fernando Po.

FLACOURTIACEAE[12]

Dovyalis macrocalyx (Oliv.) Warb. in Engl. & Prantl, Nat. Pflanzenf. 3^{6A}: 44. 1893.

Aberia ? macrocalyx Oliv. Fl. Trop. Afr. **1**: 122, 1868.

Cholo District: Cholo Mountain, one specimen in rain-forest undergrowth, tree 6 m. high, much branched, creeping, flowers green, 1200 m., Sept. 25, 1946, *17802;* ibid., frequent in rain-forest undergrowth, ♂ of *17802,* tree 4–7 m. high, flowers greenish, *17812;* Nswadzi River, in rain-forest undergrowth, ♀ tree 5 m. high, branchlets drooping, flowers whitish, fruiting calyx reddish, 840 m., Sept. 29, 1946, *17862.* Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola.

Kiggelaria africana L. Sp. Pl. 1037. 1753.

Zomba District: Zomba Plateau, second-growth rain-forest, tree 7–8 m. high, fruit green outside, yellow inside, seeds orange-red, 1450 m., June 4, 1946,

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[11] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

[12] *Kiggelaria* by E. Milne-Redhead, Royal Botanic Gardens, Kew.

16202. Mlanje District: Mlanje Mountain; Luchenya Plateau, common locally in forest, tree up to about 12 m. high, leaves grey-brown below, fruit dehiscent, seeds orange, 1890 m., July 6, 1946, *16702.* North Nyasa District: Nyika Plateau, frequent on edges of montane forest, tree 5–8 m. tall, leaves greyish-green below, fruit grey-green, seeds orange, 2250 m., Aug. 16, 1946, *17238.* Highlands of eastern Africa from Mt. Kilimanjaro to Cape Province of South Africa.

Gerrardina eylesiana Milne-Redhead, Hook. Ic. Pl. *pl. 3390.* 1939.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in rain-forest regrowths, tree 4 m. high, young leaves red, flowers white, 1860 m., June 26, 1946, *16441.* Portuguese East Africa, S. Rhodesia, and now new to Nyasaland.

PITTOSPORACEAE[13]

Pittosporum viridiflorum Sims, Bot. Mag. *pl. 1684.* 1814.

Pittosporum malosanum Bak. Kew Bull. 1897: 244. 1897.

Zomba District: Zomba Plateau, occasional in riverine rain-forest, tree 5–7 m. high, fruits green, seeds orange-red, 1500 m., June 7, 1946, *16303.* Blantyre District: Blantyre, tree in riparian rain-forest, 10 m. high, leaves pale dull green, paler below, fruits yellowish-green, seeds orange, 840 m., June 20, 1946, *16365.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common tree 5–8 m. high in forest edges and regrowths, fruits yellow, seeds orange, 1890 m., June 30, 1946, *16544.* Abyssinia to South Africa and Angola.

The generally accepted characters which have been used to separate *P. abyssinicum* A. Rich. from *P. viridiflorum* Sims are most unsatisfactory. The leaf-shape is very variable, many specimens showing both acute and obtuse leaves on the same shoot. I admit that there is a greater tendency towards acute leaves towards the south of the range, but I do not consider this alone is sufficient justification for separating off a distinct species. The degree of fusion of the sepals is also, in my opinion, a variable and unreliable character. The distribution is now known to be continuous. The relationship of *P. malosanum* Bak. to the other two "species" has always been obscure.

Dr. G. Cufodontis has revised the Kew material of *Pittosporum* since the above note was written. He keeps *P. abyssinicum* as a species distinct from *P. viridiflorum,* whilst he agrees with me that *P. viridiflorum* reaches to Abyssinia at the northern end of its range. He reduces *P. malosanum* to the synonymy of *P. viridiflorum.* The publication of Dr. Cufodontis' revision is awaited.

POLYGALACEAE[14]

Securidaca longipedunculata Fresen. Mus. Senckenb. 2: 275. 1837.

Kasungu District: Kasungu, sporadic in *Brachystegia* woodlands, tree 5–7 m. high, fruit 1–3-winged, native name (Chinyanja) ngaigaie, 1000 m., Aug. 25, 1946, *17419.* Widely spread in the savannah regions of Africa.

Polygala capillaris E. Mey. ex Harv. in Harv. & Sond. Fl. Cap. 1: 93. 1859.

Kota-kota District: Chia area, occasional on moist edges of marshes, herb 10–25 cm. high, flowers purple, 480 m., Sept. 1, 1946, *17472.* Uganda to Angola and Natal. New to Nyasaland.

Polygala gomesiana Welw. ex. Oliv. Fl. Trop. Afr. 1: 126. 1868.

Kota-kota District: Nchisi Mountain, frequent in moist gullies in *Brachystegia* woodland, 1.5–2 m. high, flowers showy, purple, 1400 m., July 25, 1946, *16939.* North Nyasa District: Nyika Plateau; Nchena-chena Spur, plentiful on shrubby grasslands, shrub 2–3 m. high, sparsely branched, leaves few, pendent, flowers purple, 1900 m., Aug. 20, 1946, *17354*.

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[13] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

[14] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

This plant differs from the Angolan form of the species in having longer and narrower leaves. Other Nyasaland and Tanganyika material at Kew, which agrees well with Mr. Brass' gatherings, shows an annual rootstock, whilst *P. gomesiana* Welw., sensu stricto, is a perennial. Exell and Mendonça in Carrisso, Consp. Fl. Angol. 1: 95 (1937) exclude Kirk's Lake Nyasa specimen cited by Oliver in the Flora of Tropical Africa, thus indicating that they consider it to be a species distinct from *P. gomesiana.* I prefer to await more and better material of *P. gomesiana* before coming to a definite conclusion regarding this eastern plant.

Polygala albida Schinz, Verh. Bot. Ver. Brand. 29: 53. 1888.

Polygala livingstoniana Chod. Mém. Soc. Phys. Genève 31: 2. 1893.

Zomba District: Zomba Plateau, occasional on open moist ground about habitations, herb, 10–15 cm. high, flowers pale greenish, 1500 m., June 4, 1946, *16212*. Widely spread in tropical Africa.

Polygala viminalis Gürke in Engl. Pflanzenw. Ost-Afr. C: 234. 1895.

Zomba District: Zomba Plateau, one example in *Brachystegia* woodland, herb 70 cm. high, flowers blue, the wings greenish but for the blue tip, 1500 m., June 4, 1946, *16216**. East and south Tropical Africa.

Polygala petitiana A. Rich. Tent. Fl. Abyss. 1: 37. 1847.

Polygala volkensii Gürke in Engl. Pflanzenw. Ost-Afr. C: 234. 1895.

Zomba District: Zomba Plateau, frequent on moist shady bank, herb 10–30 cm. high, sepals purplish-brown, petals green, 1450 m., June 5, 1946, *16251*. Widely spread in the savannah regions of Africa.

Polygala virgata Thunb. Prodr. Pl. Cap. 120. 1800.

Zomba District: Zomba Plateau, occasional about grassy edges of rain-forest, woody herb 2–2.5 m. high, apparently annual, branches forming an open crown on upper part of the solitary tall stem, flowers rose-purple, wings paler than the petals, 1820 m., May 31, 1946, *16125*. Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional about forest edges, shrub 2–3 m. high, stems solitary with numerous short branches forming a crown at its apex, flowers pinkish-purple, crest red, 1860 m., June 26, 1946, *16442*. North Nyasa District: Nyika Plateau, frequent in shrubby edges of montane forest, shrub about 2 m. high, flowers deep purple, 2300 m., Aug. 13, 1946, *17200*. Mountains from southern Tanganyika to Natal.

Muraltia flanagani Bolus, Jour. Bot. 34: 17. 1896.

Muraltia fernandi Chod. Mitt. Bot. Mus. Univ. Zürich 76: 612. 1916.

Mlanje District: Mlanje Mountain, on south-west ridge, rocky situations in grass, shrub 10–20 cm. high, flowers pink, 2400 m., June 23, 1946, *16493;* Luchenya Plateau, gregarious on grassy edge of a stream, shrub, stems up to 1 m. long, spreading and ascending, flower pale purple, 2180 m., July 3, 1946, *16641*. Southern Tanganyika, south to the Drakensburg Mts. in the Cape Province of South Africa.

I am indebted to Dr. M. R. Levyns for the determination of these two gatherings.

CARYOPHYLLACEAE[15]

Silene burchellii Otth ex DC. Prodr. 1: 374. 1824.

Mlanje District: Likubula Gorge, on banks of stream in *Brachystegia* woodland, perennial herb 40–60 cm. high, flowers pink, 1200 m., June 21, 1946, *Vernay*

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[15] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

16395; Mlanje Mountain, scattered on paths in grassland, perennial herb 30–50 cm. high, flowers purplish-green, 1950 m., July 9, 1946, *16758.* Highlands of South and East Africa.

Stellaria mannii Hook. f. Jour. Linn. Soc. Bot. 7: 183. 1864.

Cholo District: Cholo Mountain, under a rock in rain-forest, herb about 30 cm. high, with creeping habit, inflorescence viscid-hairy, flowers white, 1400 m., Sept. 20, 1946, *17662.* Cameroon Mt., and scattered above 1400 m. from Chyulu Hills in Kenya to Umtali, S. Rhodesia. New to Nyasaland.

Cerastium africanum (Hook. f.) Oliv. Fl. Trop. Afr. 1: 141. 1868.

Arenaria africana Hook. f. Jour. Linn. Soc. Bot. 7: 184. 1864.

Cerastium africanum (Hook. f.) Oliv. var. *ruwenzoriensis* Williams, Jour. Bot. 36: 342. 1898.

Zomba District: Zomba Plateau, locally common in rain-forest regrowths, herb, stems weak, up to about 80 cm. long, flowers white, calyx viscid, 1500 m., June 7, 1946, *16292.* Cameroon Mt. and highlands from Abyssinia to S. Rhodesia.

The above determination was confirmed by Dr. W. Möschl in 1949. In his published account of "Die *Cerastium*-Arten Afrikas südlich der Sahara" (Mem. Soc. Brot. 7: 53 et seq. 1951), however, Möschl extends the specific limits of *C. indicum* Wight & Arn. to include *C. africanum* (Hook. f.) Oliv. He there treats material from the African mainland, including the above-cited specimen, as *C. indicum* Wight & Arn. var. *ruwenzoriense* (Williams) Möschl, based on the variety cited above.

Drymaria cordata (L.) Willd. ex Roem. & Schult. Syst. Veg. 5: 406. 1819.

Holosteum cordatum L. Sp. Pl. 1: 88. 1753.

Zomba District: Zomba Plateau, occasional in rain-forest regrowths, herb scrambling to about 60 cm., flowers greenish, calyx viscid, 1500 m., June 7, 1946, *16293.* Widely spread throughout tropical and South Africa, Madagascar; also in tropical Asia and America.

Polycarpaea eriantha Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 303. 1847.

Kasungu District: Kasungu, on sandy soil in *Brachystegia* woodland, herb 8–12 cm. high, 1000 m., Aug. 26, 1946, *17424.* Widely spread throughout tropical Africa.

PORTULACACEAE

Portulaca oleracea L. Sp. Pl. 445 (1753) subsp. **sylvestris** (DC.) Thell. Fl. Advent. Montpellier 222. 1912; v. Poellnitz, Repert. Sp. Nov. 37: 258. 1934.

Portulaca oleracea L. var. *sylvestris* DC. Prodr. 3: 353. 1828.

Chikwawa District: Lower Mwanza River, occasional on sandy beaches, herb, flowers yellow, native name (Chinyanja) chingongo, 180 m., Oct. 4, 1946, *17953.* A very widespread weed throughout the warmer parts of the earth.

HYPERICACEAE[16]

Hypericum lanceolatum Lam. Encyc. 4: 145. 1797.

Hypericum leucoptychodes Steud. ex A. Rich. Tent. Fl. Abyss. 1: 96. 1847.

Zomba District: Zomba Plateau, frequent on open banks of streams and in moist grassy clearings, tree or shrub 2–4 m. high, a very striking species when in flower, flowers 5.5–6.5 cm. in diameter, petals and stamens yellow, styles red, 1400 m., May 28, 1946, *16068.* Mlanje District: Mlanje Mountain; Luchenya

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[16] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

Plateau, plentiful in forest regrowths, tree or shrub 2–5 m. high, producing a profusion of flowers, very showy species, flowers yellow, unripe fruit red, 1820 m., June 25, 1946, *16428*. Highlands of Tropical and South Africa, and the Mascarene Islands.

Good (Jour. Bot. 65: 329. 1927) considers that the plant from the African mainland is distinct from *H. lanceolatum* Lam., which was described from the Isle of Bourbon, and accordingly refers the former to *H. leucoptychodes* Steud. ex A. Rich. After careful examination of the now much larger collections of the African plant, I consider that it is conspecific with Lamarck's species.

Harungana madagascariensis Poir. Encyc. 6: 314. 1804.

Arungana paniculata Pers. Syn. 2: 91. 1807.
Haronga madagascariensis (Poir.) Choisy, Prodr. Mon. Hyperic. 34. 1821.
Haronga paniculata (Pers.) Lodd. ex Steud. Nom. Bot. ed. 2. 1: 722, in synon. 1841.

North Nyasa District: Nchena-chena, frequent on banks of streams in *Brachystegia* woodland, tree 5–8 m., leaves greyish below, dull green above, fruit yellow-green, native name (Chinyanja) mpefu, 1340 m., Aug. 21, 1946, *17379*. Tropical Africa, Madagascar, and the Mascarene Islands.

GUTTIFERAE[17]

Garcinia huillensis Welw. ex Oliv. Fl. Trop. Afr. 1: 167. 1868.

Garcinia buchanani Bak. Kew Bull. 1894: 354. 1894.
Garcinia gossweileri Engl. Bot. Jahrb. 40: 571. 1908.

Kota-kota District: Chia area, on bank of water-hole on dry lake-plain, ♀ tree 15 m. high, flowers yellow, 480 m., Sept. 5, 1946, *17543*. Portuguese East Africa, Nyasaland and southern Tanganyika to Angola and S. Rhodesia.

G. huillensis is very variable in shape and width of leaf. Staner (Bull. Jard. Bot. Brux. 13: 132. 1934) separates *G. buchanani* Bak. from it chiefly on account of the latter species having only two sepals. Careful examination of the type specimen of *G. buchanani* shows four sepals on the only flower-bud that there is on the specimen. Most of the sepals and petals of the other flowers have fallen, but one flower shows four petals and two sepals, the other two sepals having already dropped. I therefore reduce *G. buchanani* to the synonymy of *G. huillensis*.

DIPTEROCARPACEAE[18]

Monotes africanus A.DC. in DC. Prodr. 16^2: 624. 1868, emend. H. Bancroft in Carrisso, Consp. Fl. Angol. 1: 136. 1937.

Kota-kota District: Nchisi Mountain, frequent in *Brachystegia* woodland, tree to 8 m. tall and to 20 cm. diameter, leaves stiff, greyish below, native name (Chinyanja) chikaka, 1400 m., Aug. 5, 1946, *17133*. Nyasaland to Angola.

This is a very variable species which in some of its forms approaches *M. rufotomentosus* Gilg.

Monotes rufotomentosus Gilg, Bot. Jahrb. 28: 138. 1900.

North Nyasa District: Nchena-chena, frequent in *Brachystegia* woodland, tree 3–6 m. high, native name (Chinyanja) chikakata, 1340 m., Aug. 21, 1946, *17380*. Nyasaland.

H. Bancroft, who has made an intensive study of the genus *Monotes* wrote in 1938: "The indications at present available are that *M. rufotomentosus* Gilg is a series or plexus of hybrid forms between *M. africanus* and *M. engleri*. There are naturally specimens which approach one or other of these species very nearly."

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[17] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

[18] By E. Milne-Redhead, Royal Botanic Gardens, Kew.

MALVACEAE

Abutilon angulatum (Guill. & Perr.) Mast. in Oliv. Fl. Trop. Afr. 1: 183. 1868.

Bastardia angulata Guill. & Perr. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 65. 1831.

Cholo District: Cholo Mountain, frequent in rain-forest regrowth, shrub 2–3 m. high, foliage grey-green, flowers yellow, 1200 m., Sept. 21, 1946, *17715*. Chikwawa District: Chikwawa, occasional in dry brushy forest, shrub 2 m. high, leaves greyish, flowers yellow, 200 m., Oct. 2, 1946, *17899*. Tropical and South Africa and Madagascar.

Abutilon longicuspe Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 69. 1847.

Kota-kota District: Nchisi Mountain, common in shrubberies bordering lower montane forest, shrub about 3 m. high, leaves rugose, flowers lavender, stamens purple, 1600 m., July 26, 1946, *16959;* ibid., rain-forest borders, shrub 2 m. high, flowers purple, 1500 m., Sept. 11, 1946, *17619*. Eritrea to Nyasaland and Angola.

Pavonia urens Cav. Tert. Dissert. Bot. 137. *pl. 49, f. 1.* 1787; Ulbr. Bot. Jahrb. 57: 104. 1920; var. **urens.**

Cholo District: Cholo Mountain, rain-forest regrowth, shrub 2.5 m. high, flowers pink, 1200 m., Sept. 23, 1946, *17768*. The species widespread from the A.-E. Sudan to Nyasaland and Angola, also in Madagascar and the Mascarenes.

The following probably represent a shade-grown form of the above:

Kota-kota District: Nchisi Mountain, rain-forest borders, shrub 1 m. high, flowers pink, 1500 m., July 28, 1946, *16997;* ibid., rain-forest edges, shrub 1.5 m. high, flowers pink, 1500 m., Sept. 11, 1946, *17620*.

Ulbrich, in his monograph of the African species of *Pavonia* (Bot. Jahrb. 57: 54–184. 1920–1921), maintains *P. schimperiana* Hochst. ex A. Rich. as a species distinct from *P. urens*. So many intermediates occur that I feel it desirable to treat these two as a single species, but maintaining the varieties recognized by Ulbrich. The following new combinations are therefore necessary under *P. urens* Cav.

var. **urens.** *P. urens* Cav. sensu stricto; Ulbrich, l.c.

var. **tomentosa** (Hochst. ex Ulbr.) Brenan, comb. nov. *P. schimperiana* var. *tomentosa* Hochst. ex Ulbr. Bot. Jahrb. 57: 109. 1920.

var. **hirsuta** (Hochst. ex Ulbr.) Brenan, comb. nov. *P. schimperiana* var. *hirsuta* Hochst. ex Ulbr. Bot. Jahrb. 57: 109. 1920.

var. **glabrescens** (Ulbr.) Brenan, comb. nov. *P. schimperiana* var. *glabrescens* Ulbr. Bot. Jahrb. 57: 108. 1920.

var. **schimperiana** (Hochst. ex A. Rich.) Brenan, stat. nov. *P. schimperiana* Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 52. 1847, sensu stricto. *P. schimperiana* var. *genuina* Ulbr. Bot. Jahrb. 57: 108. 1920.

var. **obtusiloba** (Hiern) Brenan, comb. nov. *Malache schimperiana* var. *obtusiloba* Hiern, Cat. Afr. Pl. Coll. Welw. 1: 68. 1896.

The two specimens collected by Mr. Brass which I have indicated above as possibly shade-grown *P. urens* var. *urens* are possibly to be referred to var. *hirsuta*. However, their dissimilarity in facies to var. *hirsuta,* as well as the sparse presence of the large rigid stellate hairs of var. *urens* suggest that these specimens are indeed a modification of var. *urens*. Careful field observations as well as cultivation may be necessary before a satisfactory classification of the varieties of this protean species is possible.

Pavonia cf. stolzii Ulbr. Bot. Jahrb. 57: 115. 1920.

Zomba District: Zomba Plateau, rain-forest regrowth, shrub 2–2.5 m. high, branches few, erect, fleshy, plant aromatic, flowers dark pink, 1500 m., June 5, 1946, *16272*.

A close relative of *P. urens* Cav., separable by habit and fruit. The specimen cited is not very typical in habit, and the fruits are not yet formed: consequently an exact identification is impossible. *P. stolzii* was described from S. W. Tanganyika Territory, but plants that I consider *(e descr. et icon.)* to be this have been previously collected in Nyasaland (*McClounie 142* from the Nyika Plateau, *Meller s.n.* from Mount Chiradzulu, and *Buchanan 145* without exact locality).

Pavonia columella Cav. Tert. Dissert. Bot. 138, *pl. 48, f. 3.* 1787; Ulbr. Bot. Jahrb. 57: 135. 1920.

Pavonia meyeri Mast. in Oliv. Fl. Trop. Afr. 1: 191. 1868.

Zomba District: Zomba Plateau, on moist river-bank, shrub 1.5 m. high, flowers pink, showy, 1450 m., June 2, 1946, *Anthony 16147.* Cholo District: Cholo Mountain, frequent in rain-forest regrowth, shrub 2–3 m. high, plant viscid, flowers pink, 1200 m., Sept. 22, 1946, *17740.* Nyasaland to South Africa, also in Madagascar and Réunion.

There has been considerable doubt hitherto about the right name for this species; some, following Ulbrich, have maintained *P. columella,* others (e.g. Burtt Davy, Fl. Transvaal 2: 278. 1932), stating that *P. columella,* which was based on a plant from Bourbon, is not conspecific with the plant of continental Africa, have therefore used the name *P. meyeri.* In an endeavour to decide between these views, the type of *P. columella* Cav., which is in Herb. Antoine Laurent de Jussieu (No. 12348) at the Muséum National d'Histoire Naturelle at Paris, was borrowed, and thanks are due to the authorities of that institution for their courtesy in this matter.

The type-specimen does not represent the normal continental African plant, being more glabrescent than usual, with shorter indumentum on the stem. The alleged difference in the calyx (see Burtt Davy, *l.c.*) eludes me. But I can detect no differences other than those of the indumentum, which are slight and a matter of degree; and I can match the glabrescence of the leaves and the shortness of the stem-indumentum in specimens from continental Africa.

I am therefore not prepared to consider *P. columella* specifically separable from *P. meyeri,* although the African plant may be a variety. The material from Bourbon is much too limited at present to judge of this, and I feel it wiser to follow Ulbrich in treating *P. meyeri* as a synonym of *P. columella* Cav.

Hibiscus praeteritus R. A. Dyer, Fl. Pl. S. Afr. 11: *pl. 436.* 1931.

Chikwawa District: Chikwawa, occasional in dry brushy forest of elevated river-plain, shrub 2 m. high, flowers red, 200 m., Oct. 2, 1946, *17888.* Nyasaland and Angola to the Transvaal.

Hibiscus shirensis Sprague & Hutch. Kew Bull. 1907: 47. 1907.

Mlanje District: Likubula, on edge of a marsh, flowers pink, 820 m., June 27, 1946, *Vernay 16489**. Kota-kota District: Kota-kota, shrub, flowers purple, 450 m., Aug., 1946, *Vernay 17402**. Nyasaland and Portuguese East Africa, a possible variant in N. Rhodesia and the adjacent part of the Belgian Congo.

Hibiscus rhodanthus Gürke apud Schinz, Bull. Herb. Boiss. 3: 405. 1895.

Kota-kota District: Nchisi Mountain, beside a path in *Brachystegia* woodland, shrub, flowers scarlet, very showy, 1400 m., July 25, 1946, *Shortridge 16925**; ibid., roadsides in *Brachystegia* woodland, shrub, flowers scarlet, showy, 1400 m., July 26, 1946, *16970.* Tanganyika Territory to S. Rhodesia and Angola.

Hibiscus gossypinus Thunb. Prodr. Fl. Cap. 118. 1800.

Blantyre District: Blantyre, edge of a native village, shrub 2 m. high, brown-hairy, flowers white, 1100 m., June 17, 1946, *16341.* Cholo District: Cholo

Mountain, common in rain-forest regrowth, shrub 2–3 m. high, brown-hairy, flowers white, 1200 m., Sept. 19, 1946, *17646*. Uganda to South Africa.

Hochreutiner, in his revision of *Hibiscus* (Ann. Cons. Jard. Bot. Genève 4: 84. 1900) makes *H. gossypinus* Thunb. a synonym under *H. ferrugineus* Cav.; but wrongly, for the latter is a quite distinct species from Madagascar.

Hibiscus near **calyphyllus** Cav. Quinta Dissert. Bot. 283. *pl. 140.* 1788.

Chikwawa District: Chikwawa, in *Acacia albida* woodland, shrub 20 cm. high, flowers yellow with purple centre, 200 m., Oct. 3, 1946, *17916**. Tropical and South Africa *(H. calyphyllus).*

Brass 17916 differs from normal *H. calyphyllus* in the numerous short lateral branches coming from a leafless main stem, and in the soft, denser shorter and more uniform indumentum. Further material is necessary to decide whether this is anything more than a form or state of *H. calyphyllus.*

Hibiscus ludwigii Eckl. & Zeyh. Enum. Pl. Afr. Austr. 39. 1834; Hochr. Ann. Cons. Jard. Bot. Genève 4: 161. 1900.

Kota-kota District: Nchisi Mountain, common in shrubberies bordering rain-forest, shrub 2–3 m. high, hairs irritant, easily detached, petals yellow, purple at base, not opening fully, 1650 m., July 31, 1946, *17063*. Abyssinia to South Africa.

Hibiscus surattensis L. Sp. Pl. 696. 1753.

Chikwawa District: Lower Mwanza River, on a sandy beach, subprostrate shrub, flowers yellow with mauve tube, 180 m., Oct. 4, 1946, *17967;* ibid., occasional on sandy beaches, subprostrate shrub, flowers yellow with maroon centre, 180 m., Oct. 6, 1946, *18016*. Widely distributed in the tropics of the Old World.

Hibiscus diversifolius Jacq. Coll. Bot. Chem. Hist. Nat. 2: 307. 1788; Ic. Pl. Rar. 3: 12. *pl. 551.* 1786–1793.

Kota-kota District: Chia area, on sandy lake-shores, shrub 1.5 m. high, branches numerous, upright, flowers wine-coloured with darker reddish throat, 470 m., Sept. 2, 1946, *17480*. Cholo District: Cholo Mountain, frequent in rain-forest regrowth, scrambling shrub up to 10 m. high, flowers purplish-pink with dark reddish-purple throat, 1200 m., Sept. 21, 1946, *17707*. Tropical Africa and America, also Madagascar.

Hibiscus vitifolius L. Sp. Pl. 696. 1753.

Kasungu District: Kasungu, weed in old garden, shrub 1 m. high, flowers yellow, throat purple, 1000 m., Aug. 27, 1946, *17439*. Cholo District: Cholo Mountain, common in rain-forest regrowth, scrambling shrub 2–3 m. high, flowers yellow with dark purple throat, 1200 m., Sept. 21, 1946, *17720*. Chikwawa District: Chikwawa, frequent about native village, shrub 1–1.5 m. high, flowers with maroon centre, showy, 180 m., Oct. 5, 1946, *17983*. Tropics of Africa, Asia, and Australia, also West Indies (perhaps introduced).

Hibiscus vitifolius L. var. **ricinifolius** (E. Mey. ex Harv.) Hochr. Ann. Cons. Jard. Bot. Genève 4: 170. 1900; Exell & Mendonça in Carrisso, Consp. Fl. Angol. 1: 177. 1951.

Hibiscus jatrophaefolius A. Rich. Tent. Fl. Abyss. 1: 58. 1847.
Hibiscus ricinoides Garcke, Bot. Zeit. 7: 834. 1849.
Hibiscus ricinifolius E. Mey. ex Harv. in Harv. & Sond. Fl. Cap. 1:171. 1860.
Hibiscus natalitius Harv. in Harv. & Sond. Fl. Cap. 2: 587. 1862.

Cholo District: Cholo Mountain, undergrowth of primary rain-forest, scrambling shrub 3 m. high, flowers yellow with dark red throat, 1200 m., Sept. 20, 1946, *17658*. Eritrea, Abyssinia, Uganda, Nyasaland, Angola, Natal.

The reduction of *H. ricinoides* is on the authority of Harvey and Hochreutiner, who both consider it and *H. ricinifolius* conspecific. I am indebted to the authorities of the Vienna Herbarium for kindly loaning the type-specimen of *H. ricinifolius,* which is in Herb. Drège; and to the University Professor of Botany, Trinity College, Dublin, for what is presumably the type-specimen of *H. natalitius* from Herb. Harvey. Type or isotype material of the other names mentioned is at Kew.

It should be noted that Hochreutiner's sinking of *H. natalitius* under *H. vitifolius* L. var. *heterotrichus* (DC.) Hochr. is quite wrong, as is shown by examination of the type-specimen of *Hibiscus heterotrichus* DC., received on loan from Geneva.

Mr. Brass' specimen is the first evidence for the occurrence of *H. vitifolius* var. *ricinifolius* in Nyasaland; it should be looked out for in Tanganyika Territory, where it surely must occur. However, it appears to be a scarce plant S. of Uganda, only once or twice collected in each territory. It is possible that it occurs outside Africa, since there is a specimen from the Island of Timorlaut, in the East Indies, that obviously comes very close to *H. vitifolius* var. *ricinifolius* but the specimen is so poor that it would be unwise to be certain.

STERCULIACEAE

Sterculia quinqueloba (Garcke) K. Schum. Bot. Jahrb. 15: 135. 1892; in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 104. 1900.

Cola quinqueloba Garcke in Peters, Reise Mossamb. Bot. 1: 130. 1861.

Chikwawa District: Chikwawa, characteristic tree of woodlands on stony ridges, tree 10–15 m. high and to 0.6 m. in diameter, deciduous and now leafless, the smooth grey bark of trunk and branches make the tree very conspicuous, native name mgoza, 300 m., Oct. 5, 1946, *17993.* Tanganyika Territory to Portuguese East Africa and Angola.

Sterculia africana (Lour.) Fiori, Agr. Colon. Ital. 5: suppl. 37. 1912.

Triphaca africana Lour. Fl. Cochinchin. 577. 1790.

Sterculia triphaca R. Br. in Benn. Pl. Jav. Rar. 228. 1844; K. Schum. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 105. 1900, pro parte.

Chikwawa District: Lower Mwanza River, plentiful in open forest of river-plains, tree 20–25 m. high and to 1 m. in diameter, deciduous, now leafless, bark pale yellowish-green, peeling in thin papery flakes, flowers yellow streaked with red, native name (Chinyanja) njali, 180 m., Oct. 4, 1946, *17950.* Kenya to Portuguese East Africa and Nyasaland, with varieties extending to Eritrea, Socotra, and Hereroland (fide K. Schumann).

Dombeya Cav. subg. **Dombeya** (subg. **Eudombeya** K. Schum.).

The four gatherings made of this subgenus belong to a complex of species with more or less lobed leaves and large flowers, extending from South Africa to Uganda and the Anglo-Egyptian Sudan. The taxonomy of this group is at present chaotic; it is hard to say if we are dealing with a few very variable species or whether there are numerous closely related ones. The herbarium-material at present available is insufficient to decide. Therefore, although the specimens collected by the Expedition do not exactly square with authentic material of any of the species here at Kew, I have felt it better to refer them to their apparent nearest affinities rather than describe new species of very doubtful value. Until much more material is available, and especially collections made to show the range of variety within populations, a satisfactory classification will be difficult to attain.

Dombeya sp. nr. **dawei** Sprague, Jour. Linn. Soc. Bot. 37: 501. 1906; et **burgessiae** Gerr. ex Harv. & Sond. Fl. Cap. 2: 590. 1862.

Zomba District: Zomba, occasional on roadsides and in old fields, herb 2–2.5 m. high, flower delicate pale pink, 1000 m., May 26, 1946, *Shortridge 16026*.

Dombeya sp. nr. **nyasica** Exell, Jour. Bot. 77: 166. 1939.

Kota-kota District: Nchisi Mountain, frequent in moist gullies in *Brachystegia* woodland, shrub 1.5–2 m. high, flowers pink, showy, 1400 m., July 25, 1946, *Brass 16929*.

Mr. Brass' specimen differs from the isotype of *D. nyasica*, which was collected between Kota-kota and Dowa, only in the more acuminate leaf-lobing. Further material will probably prove this to be a variable character.

Dombeya sp. nr. **platypoda** K. Schum. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 29. 1900.

Kota-kota District: Nchisi Mountain, plentiful in shrubberies bordering lower montane forest, shrub about 2 m. high, flowers pale pink, 1600 m., July 26, 1946, *16973*.

Differs from the type of *D. platypoda*, which was collected at Fwambo in N. Rhodesia, in the densely pubescent peduncles and young stems.

Dombeya sp.

North Nyasa District: Nyika Plateau, edges of juniper forest, shrub 3–4 m. high, leaves greyish, flowers pink, showy, 2250 m., Aug. 11, 1946, *17183*.

The affinity of this specimen is doubtful.

Dombeya Cav. subg. **Xeropetalum** (Planch.) K. Schum.

Dombeya rotundifolia (Hochst.) Planch. Fl. Serres 6: 225. 1850–1851; Harv. in Harv. & Sond. Fl. Cap. 1: 221. 1859–1860; K. Schum. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 35. 1900.

Xeropetalum rotundifolium Hochst. Flora 27: 295. 1844.

[*Dombeya spectabilis* (non Boj.) Mast. in Oliv. Fl. Trop. Afr. 1: 227. 1868, p.p., quoad spec. *Meller*.]

Dombeya multiflora Planch. var. *vestita* K. Schum. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 34. 1900, p.p., quoad spec. *Meller & Buchanan 52* et *Nichols.*, verisim. etiam spec. omn. nyass. et mossambic.

Blantyre District: Limbe, frequent in *Brachystegia* woodland, tree 8 m. high, bark rough, flowers delicate pale pink, an attractive species, native name (Chinyanja) mato, 1000 m., Oct. 1, 1946, *17885*. Uganda to South Africa.

Dombeya shupangae ["mupangae"] K. Schum. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 39. 1900; corr. Sprague, Jour. Bot. 59: 349. 1921.

Kota-kota District: Nchisi Mountain, occasional in rain-forests, tree 10 m. high and 25 cm. in diameter, semi-deciduous, flowering branchlets usually leafless, flowers pink, 1400 m., July 27, 1946, *16982;* ibid., occasional in rain-forested gullies in *Brachystegia* woodland, tree 4–10 m. high, flowers delicate pinkish-white, 1350 m., Sept. 9, 1946, *17577*. Tanganyika, Nyasaland, and Portuguese East Africa.

A comment on the orthography of the specific epithet seems desirable. The generally accepted spelling of the type-locality, in Portuguese East Africa, is Shupanga. Schumann misread the locality on the label of the type-specimen as Mupanga; the spelling on this label appears to be Chupanga, and at first sight there appears a case for altering the epithet to "*chupangae*"; but Kirk in his correspondence used the spelling Shupanga, and it seems likely that the label itself has a misspelling of the locality. I therefore leave Sprague's correction as it stands.

Mr. Brass' specimen is the first record from Nyasaland. Although Schumann (l.c.) cites Meller's specimen from the Manganja Hills in Nyasaland under *D. "mupangae,"* the specimen is in fact *D. rotundifolia* (Hochst.) Planch.

Waltheria indica L. Sp. Pl. 673. 1753.

Waltheria americana L. Sp. Pl. 673. 1753; K. Schum. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 5: 45. 1900.

Chikwawa District: Lower Mwanza River, one plant on a sandy beach, herb 60 cm. high, flowers yellow, 180 m., Oct. 6, 1946, *18010*. Widespread in the tropics and subtropics.

For reasons for adopting *W. indica* as the valid name instead of *W. americana*, see Exell and Mendonça in Carrisso, Consp. Fl. Angol. 1: 193. (1951).

TILIACEAE

Grewia sulcata Mast. in Oliv. Fl. Trop. Afr. 1: 252. 1868; Burret, Bot. Jahrb. 45: 188. 1910, excl. vars.

Chikwawa District: Lower Mwanza River, occasional on sandy river-banks, shrub about 1 m. high, flowers greenish-white, native name (Chinyanja) mkungubwe, 180 m., Oct. 6, 1946, 17999. New to Nyasaland; previously known from Tanganyika Territory (fide Burret) and Portuguese East Africa.

Triumfetta welwitschii Mast. in Oliv. Fl. Trop. Afr. 1: 255. 1868; Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 253. 1909.

Triumfetta rehmannii Szysz. Polypet. Thalamifl. Rehmann. 151. 1887.
Triumfetta mastersii Bak. f. Trans. Linn. Soc. Bot. II. 4: 6. 1894; Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 252. 1909.
Triumfetta laxiflora Engl. Bot. Jahrb. 39: 579. 1907.
Triumfetta welwitschii Mast. var. *typica* Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 253. 1909.
Triumfetta welwitschii Mast. var. *rehmannii* (Szysz.) Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 253. 1909.
Triumfetta welwitschii Mast. var. *laxiflora* (Engl.) Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 254. 1909.
Triumfetta mastersii Bak. f. var. *typica* Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 252. 1909.

Kota-kota District: Chintembwe, rocky grasslands, perennial herb, rootstock large, woody, young shoots flowering after burning of the grass, flowers yellow, 1400 m., Sept. 9, 1946, *17586*. Southwestern Tanganyika Territory to the Transvaal and Angola.

The treatment of *Triumfetta welwitschii* and *T. mastersii* by Sprague & Hutchinson in their revision of the African Triumfettas (Jour. Linn. Soc. Bot. 39: 231-276. 1909) is unsatisfactory. The varieties of *T. welwitschii* that they recognize (var. *rehmannii*, var. *laxiflora*) are merely stages in development; the changes that the pre-rains flowerers of the African savannahs undergo in a short space of time at the end of the dry season and the early part of the rains must be seen to be appreciated.

T. mastersii Bak. f., sensu stricto, differs from *T. welwitschii* only in the slightly shorter and broader leaves; these characters are, however, so inconstant and variable that I feel unable to separate *T. mastersii* even varietally.

T. mastersii var. *heliocarpa* (K. Schum.) Sprague & Hutch. is a very distinct and striking plant in its spreading indumentum and its large broad leaves with prominent venation and coarsely and densely crenate-serrulate margins, and I would prefer to maintain it as originally published—a distinct species, *T. heliocarpa* K. Schum.; though I should add that in structure of flower and fruit it does not appear separable from *T. welwitschii.*

Triumfetta welwitschii Mast. var. **descampsii** (De Wild. & Th. Dur.) Brenan, comb. nov.

Triumfetta descampsii De Wild. & Th. Dur. Bull. Soc. Roy. Bot. Belg. 39: 95. 1901.
Triumfetta mastersii Bak. f. var. *descampsii* (De Wild. & Th. Dur.) Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 252. 1909.

Dedza District: Dedza, sporadic in *Brachystegia* woodland, perennial herb, young shoots flowering after the burning of the grass, rootstock more or less fleshy, flowers yellow, 1500 m., Sept. 13, 1946, *17627.** Transvaal to southwestern Tanganyika Territory and the Belgian Congo.

The var. *descampsii* in my view covers those forms of *T. welwitschii* in which the leaves become rapidly glabrous or nearly so on the lower surface, and are not more or less densely and persistently stellate-tomentellous beneath as in typical *T. welwitschii.* Intermediates occur, and the view that *descampsii* cannot be separated specifically is undoubtedly correct. As in *T. welwitschii* proper the width of the leaves in var. *descampsii* varies a good deal. The type of *Triumfetta descampsii* (Belgian Congo: Babondo, Lomami, July 5, 1891, *Descamps s.n.*) which, through the kindness of the Director of the Jardin Botanique de l'État, Brussels, I have had on loan, shows unusually broad leaves 1.5–2.4 cm. wide, contrasting with the normally much narrower leaves of specimens from elsewhere. I do not consider, however, that leaf-width is of any great taxonomic significance in this species.

Triumfetta rhomboidea Jacq. Enum. Pl. Carib. 22. 1760; Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 266. 1909.

Cholo District: Cholo Mountain, frequent in young rain-forest regrowth, shrub 1–2 m. high, flowers yellow, 1200 m., Sept. 19, 1946, *17645.* Throughout the tropics.

Triumfetta pilosa Roth, Nov. Pl. Sp. Ind. Or. 223. 1821; var. **nyasana** Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 274. 1909.

Kota-kota District: Nchisi Mountain, shrubby rain-forest borders, shrub 1.5 m. high, 1500 m., July 29, 1946, *17019.* The species in the tropics of the Old World; the var. in East Africa from Uganda to S. Rhodesia and Portuguese East Africa.

Triumfetta effusa E. Mey. ex Harv. & Sond. Fl. Cap. 1: 228. 1860; Sprague & Hutch. Jour. Linn. Soc. Bot. 39: 275. 1909.

Mlanje District: Mlanje Mountain, west slope, in low brush on rocky slopes, shrub 1 m. high, 1880 m., July 18, 1946, *16865.* N. and S. Rhodesia to South Africa; new to Nyasaland.

Sparrmannia L. f.

There has been difference of opinion about the spelling of this generic name. In Suppl. Plant. (1781), where this genus was published, the following references occur:

p. 41. The genus is described with the spelling "Sparmannia."

Lower down it is said that the genus is named "In memoriam Andreae Sparrmann."

p. 265. *Sparrmannia* [sic] *africana* is described.

p. 462 (index). "*Sparrmannia* 41. 265."

It is clear from this that the spelling intended by Linnaeus fil. was *Sparrmannia* and that *Sparmannia* was an unintentional orthographic error.

Sparrmannia ricinocarpa (Eckl. & Zeyh.) Kuntze, Rev. Gen. Pl. 3^2: 26. 1898; Weimarck, Svensk Bot. Tidskr. 27: 400 et. seq. 1933.

Urena ricinocarpa Eckl. & Zeyh. Enum. Pl. Afr. Austr. 1: 37. 1835.

Zomba District: Zomba Plateau, plentiful in grassy clearings, subshrub 1.5 m. high, leaves said to be eaten, cooked as a green vegetable, flowers white, 1400 m., May 28, 1946, *16064;* ibid., common on rain-forest edges and regrowth, shrub about 1.5 m. high, flowers white, 1500 m., June 5, 1946, *16270.* North Nyasa District: Nyika Plateau, common in shrubby borders of montane forest, shrub 1.5–2 m. high, flowers pinkish-white, 2320 m., Aug. 16, 1946, *17262.* A.-E. Sudan to South Africa.

LINACEAE

Radiola linoides Roth, Tent. Fl. Germ. **1**: 17. 1788; Gmel. Syst. Nat. 2^1: 289. 1791; Mansfeld, Repert. Sp. Nov. **46**: 301. 1939.

Linum radiola L. Sp. Pl. 281. 1753.

Millegrana radiola (L.) Druce, Fl. Berks. 114. 1897; Fernald, Gray's Man. ed. 8. 943. 1950.

North Nyasa District: Nyika Plateau, between grass clumps in open grasslands, herb about 2 cm. high, flowers green, 2200 m., Aug. 17, 1946, *17292.* Europe (N. to Scandinavia and Estonia, S. to Spain, and from Russia in the E. to Ireland in the W.), Madeira, N. Africa (Morocco and Tunis); in tropical Africa known only from the Cameroon Mountain and Nyasaland; naturalised in Nova Scotia.

A diminutive plant with a most interesting distribution. *Radiola* is often ascribed to Roth (1788), but, as Messrs. Dandy and Exell point out to me, it was first described by Hill in 1756 (see Ind. Kew. Suppl. 5).

Hugonia sp.

Kasungu District: Kasungu, Kasungu Hill, frequent on rocky slopes, shrub 3–6 m. high, subscandent, often tree-like in habit, fruit more or less fleshy, yellow-green, 1100 m., Aug. 28, 1946, *17459.*

Flowers are wanted in order that this plant may be named with certainty.

ERYTHROXYLACEAE

Erythroxylum emarginatum ["Erytroxylon emarginatus"] Thonn. in Schumach. & Thonn. Beskr. Guin. Pl. 224. 1827; O. E. Schulz, Pflanzenreich 29 (4^{134}): 135. 1907.

Cholo District: Cholo Mountain, in rain-forest undergrowths, shrub 2–3 m. high, flowers white, 1200 m., Sept. 21, 1946, *17713;* Nswadzi River, common in riverine rain-forest undergrowth, tree 4–6 m. high, flowers white, 840 m., Sept. 29, 1946, *17866.* In W. Africa from Sierra Leone to Angola; in E. Africa from Uganda southwards to S. Rhodesia, with a variety extending to Natal.

GERANIACEAE[19]

Geranium aculeolatum Oliv. Fl. Trop. Afr. **1**: 291. 1868.

Zomba District: Zomba Plateau, frequent in grassy rain-forest regrowths, vine, scrambling to a height of 2 m., viscid, flowers white, 1450 m., June 3, 1946, *16186.* Highlands of E. Africa from Abyssinia to Nyasaland.

Geranium simense Hochst. ex A. Rich. Tent. Fl. Abyss. **1**: 116. 1847.

Zomba District: Zomba Plateau, on shady roadsides, herb with weak reclining habit, stems up to more or less 60 cm. long, flowers pink, 1500 m., June 4, 1946, *16203.* Highlands from Nigeria and Fernando Po east to Abyssinia and south to S. Rhodesia.

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[19] *Geranium* by E. Milne-Redhead, Royal Botanic Gardens, Kew.

Geranium latistipulatum Hochst. ex. A. Rich. Tent. Fl. Abyss. **1**: 117. 1847.

Mlanje District: Mlanje Mountain, uncommon, gregarious amongst sheltering rocks on grassland, herb 50 cm. high, flowers pink, 2100 m., July 11, 1946, *16789*. Highlands of E. Africa from Abyssinia to Nyasaland; new to Nyasaland.

Geranium nyassense Knuth, Repert. Sp. Nov. **18**: 289. 1922.

Geranium ukingense Knuth, Repert. Sp. Nov. **18**: 292. 1922.

North Nyasa District: Nyika Plateau, gregarious in edge of forest regrowths, perennial herb 70–90 cm. high, leaves grey below, old leaves red, flowers pale pink, 2340 m., Aug. 12, 1946, *17189*. Highlands from Tanganyika to S. Rhodesia.

Geranium vagans Bak. Kew Bull. **1897**: 246. 1897.

Geranium angustisectum Knuth, Pflanzenreich **53** (4^{129}): 207. 1912.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, common in short grass of slopes, attractive perennial herb about 50 cm. high, roots tuberous, flowers 2.0–2.3 cm. diameter, petals white, styles red, 2000 m., Aug. 10, 1946, *17148*. Highlands of E. Africa from Kenya and Uganda south to Nyasaland.

Pelargonium whytei Bak. Kew Bull. **1897**: 246. 1897; Knuth, Pflanzenreich **53** (4^{129}): 394. 1912.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, occasional in open grassland, perennial herb, stems to 1 m. or more long, scrambling, stems and under side of leaves reddish, flowers pink striped with red, 2000 m., Aug. 20, 1946, *17346;* ibid., common among shrubs in grassland, herb 1 m. high, stems weak, scrambling, flowers pink, 1500 m., Aug. 20, 1946, *17364*. Southwestern Tanganyika Territory and Nyasaland.

OXALIDACEAE

Oxalis obliquifolia Steud. ex A. Rich. Tent. Fl. Abyss. **1**: 123. 1847; Knuth, Pflanzenreich **95** (4^{130}): 348. 1930; Salter, Jour. S. Afr. Bot. Suppl. Vol. **1**: 154. 1944.

Zomba District: Zomba Plateau, occasional on moist shaded ground on open rocky slopes, herb 10–20 cm. high, very attractive, flower-tube yellow, lobes pale purple, native name (Chinyanja) ching-gongo, 1450 m., June 5, 1946, *16232;* ibid., locally common in moist semi-shade, herb 6–9 cm. high, corolla-tube yellow, lobes rose-coloured, 1500 m., June 5, 1946, *16266*. A.-E. Sudan and Abyssinia, southwards through E. Africa to Nyasaland and South Africa.

Biophytum sensitivum (L.) DC. Prodr. **1**: 690. 1824; Knuth, Pflanzenreich **95** (4^{130}): 393. 1930.

Oxalis sensitiva L. Sp. Pl. 434. 1753.

Mlanje District: Likubula Gorge, frequent on rocky banks of river, herb 10–20 cm. high, flowers purple, later orange, 840 m., June 20, 1946, *16371*. Widespread in tropical Africa and Asia.

Biophytum petersianum Klotzsch in Peters, Reise Mossamb. Bot. 81. *pl. 15*. 1861.

Oxalis sessilis Ham. ex Wall. Cat. n. 4344. 1831 (nom. nud.); ex Baill. Bull. Soc. Linn. Paris **1**: 598. 1886 (nom. illegit.).

Biophytum sessile (Ham.) Knuth, Pflanzenreich **95** (4^{130}): 393. 1930.

Zomba District: Zomba Plateau, trodden ground about habitations, herb 4–10 m. high, flowers yellow, 1500 m., June 4, 1946, *16224**. Widespread in tropical Africa and Asia.

BALSAMINACEAE

Impatiens ? assurgens Bak. Kew Bull. **1895**: 64. 1895; Gilg, Bot. Jahrb. **43**: 99. 1909; Engl. Pflanzenw. Afr. **3**^{2}: 299. 1921.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, one plant beside a grassland trail, pale pink herb, 1900 m., Aug. 20, 1946, *17356**. Portuguese East Africa, Nyasaland, and N. Rhodesia.

The material is too poor for certain identification.

Impatiens shirensis Bak. f. Trans. Linn. Soc. Bot. II. 4: 7. 1894; Gilg, Bot. Jahrb. **43**: 111. 1909.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on banks of streams in forest, shrub 1.5–2 m. high, more or less fleshy, branches numerous, erect, flowers white or pinkish-white, 1820 m., June 25, 1946, *16423*. Nyasaland only.

Impatiens zombensis Bak. Kew Bull. **1897**: 247. 1897; Gilg, Bot. Jahrb. **43**: 114. 1909; Engl. Pflanzenw. Afr. **3**^{2}: 302. 1921.

Zomba District: Zomba Plateau, common on moist shady banks of a stream, herb 50–100 cm. high, flowers reddish-pink, 2.5 cm. in diameter, 1400 m., May 28, 1946, *16043*. Mlanje District: Mlanje Mountain, west slopes, on moist banks of streams, herb 15–40 cm. high, plant erect, fleshy, stems and branches red, flowers mauve, 1700 m., June 24, 1946, *16408;* ibid., Luchenya Plateau, plentiful on open banks of streams in forest, often in dense clumps, herb 30–40 cm., stems and branches red, flowers rose-pink, showy, 1820 m., July 1, 1946, *16584*.

Brass 16408 and *16584* are rather more glabrescent than *I. zombensis* but the same as a specimen at Kew collected in 1891 by Whyte on Mount Mlanje. The Mlanje plant may be varietally separable.

Impatiens zombensis Bak. var. **micrantha** Brenan, var. nov.

A typo differt foliis superne saepe subverticillatis plerumque pro rata angustioribus superioribus 2–5 × 0.8–1.7 cm. inferioribus usque ad 10 × 3 cm., nervis lateralibus foliorum utrinque 4–6 (in *I. zombensi* typica 6–8), floribus minoribus, vexillo 3–4.5 mm. longo 3.5–5.5 mm. lato (nec 6–9 × 5–7 mm.), alis 8–11 mm. longis lobis angustioribus.

Blantyre District: Blantyre; Shire Highlands, 1887, *J. T. Last s.n.* (Herb. Kew.). Zomba District: Zomba Plateau, local on moist shady banks of a stream in rain-forest, herb 20–40 cm. high, stems and branches red, flower mauve, about half the size of the common plant of the area, 1500 m., June 7, 1946, *16321* (TYPUS varietatis).

Later research may show that this is a distinct species. At present I do not consider the characters important or constant enough to be more than varietal.

Impatiens walleriana Hook. f. in Oliv. Fl. Trop. Afr. **1**: 302. 1868; Gilg, Bot. Jahrb. **43**: 118. 1909.

Cholo District: Cholo Mountain, open rocky bed of rain-forest gulley, herb 30–50 cm. high, branched into a flat top, very fleshy, flowers dark carmine, 1200 m., Sept. 24, 1946, *17779;* ibid., frequent in rain-forest gullies, herb about 50 cm. high, branched into a flat top, flowers reddish-carmine, 1200 m., Sept. 26, 1946, *17828*. E. Africa, from Kenya to Portuguese East Africa and Nyasaland.

Impatiens sp. (sect. *Microcentron* Warb. § *Stenocentron* Warb.)

North Nyasa District: Nyika Plateau, plentiful on borders of montane forest, herb about 1 m. high, erect, branches and petioles red, petals mauve, sepals and spur red, 2300 m., Aug. 13, 1946, *17204*.

I have not matched this exactly, and it may be new. I think that as it belongs to a difficult and critical group it is better to await further material before describing it.

Impatiens sp.

Zomba District: Zomba Plateau, on an open seepage slope, herb 20–30 cm. high, fleshy, stems red, flowers mauve, 1450 m., June 9, 1946, *Vernay 16286**.

The flowers of this specimen are not adequate for dissection and I am doubtful about it. I suspect that it is the same as the specimen at Kew: Portuguese East Africa: Nyassa Province: Between Unango and Mtonia, 1896, *Rev. P. Johnson s.n.;* which is closely similar to my *I. zombensis* var. *micrantha* (see above) but has the labellum pubescent outside and the fruits becoming hairy. The last character is particularly well-shown by Mr. Vernay's specimen. If this suggestion is right then Mr. Vernay's specimen will constitute an additional form or variety of *I. zombensis.* Unfortunately the Rev. Mr. Johnson's specimen is not good enough to serve as a type.

RUTACEAE

Oricia swynnertonii (Bak. f.) Verdoorn, Kew Bull. **1926**: 413. 1926.

Teclea swynnertonii Bak. f. Jour. Linn. Soc. Bot. **40**: 35. *pl. 2, f. 1–5.* 1911.

Cholo District: Cholo Mountain, open rocky situation in rain-forest, tree 8 m. high, flowers cream, 1400 m., Sept. 20, 1946, *17663.* Nyasaland and S. Rhodesia.

Toddalia asiatica (L.) Lam. Tab. Encyc. 2: 116. 1797; Verdoorn, Kew Bull. **1926**: 400. 1926.

Paullinia asiatica L. Sp. Pl. 365. 1753.

Zomba District: Zomba Plateau, occasional in rain-forest borders, vine 3–4 m. high, flower not seen, fruit green, 1450 m., June 4, 1946, *16205.* Cholo District: Cholo Mountain, scrambling in rain-forest, subscandent, 8 m. high, fruit orange, eaten by the natives, 1200 m., Sept. 23, 1946, *17769.* Eastern and central Africa from the A.-E. Sudan southwards to the Transvaal, also in Madagascar, the Mascarene Islands, and tropical Asia.

Clausena anisata ["Claussena"] (Willd.) Hook. f. ex Benth. in Hook. Niger Fl. 256. 1849; Oliv. Jour. Linn. Soc. Bot. 5 suppl. **2**: 34. 1861; Fl. Trop. Afr. **1**: 308. 1868; Engl. in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **19A**: 322. 1931.

Amyris anisata Willd. Sp. Pl. **2**: 337. 1799.

Kota-kota District: Chenga Hill, brushy dry forest amongst rocks, shrub 4 m. high, deciduous, now in young leaf, flowers white, 1600 m., Sept. 9, 1946, *17609.* Widespread in tropical Africa.

Aeglopsis chevalieri Swingle, Mém. Soc. Bot. France **8d**: 240. *pl. 2, f. 1–9, pl. 3.* 1912.

BELGIAN CONGO: Cultivated in the Jardin d'Essais du Frère Gillet, tree 4–7 m. high, 20 cm. in diameter at breast-height, flowers greenish-white, inconspicuous, fruit 3.5–4.5 cm. in diameter, hard, orange, seeds immersed in very sticky mucilaginous substance, said to be used as a grafting stock for citrous fruits, 530 m., May 16, 1946, *16022.** Native of the Ivory Coast and the Gold Coast.

The leaves of *Brass 16022* are rather smaller than usual, perhaps because of the environment.

SIMAROUBACEAE

Balanites ? pedicellaris Mildbr. & Schlecht. Bot. Jahrb. 51: 162. 1913.

Chikwawa District: Chikwawa, in dry brushy forest of elevated river-plain, tree or shrub 4 m. high, leaves thick and fleshy, fruit orange, native name (Chinyanja) nalunga, 200 m., Oct. 2, 1946, *17906.*

Brass 17906 shows only twigs, leaves and fruit. So far it agrees satisfactorily with *B. pedicellaris;* but since this species has up till now been collected only in Uganda, Kenya, and Tanganyika Territory, I prefer to await flowers before identifying *Brass 17906* certainly. Although I have not seen the type-specimen, I feel that the original description and named specimens at Kew of *Balanites australis* Bremek. (Ann. Transv. Mus. 15: 244. 1933) indicate a plant too close to *B. pedicellaris* to be separated specifically. If this supposition is confirmed, then the locality of *Brass 17906* would be intermediate in position between the east African area of *B. pedicellaris* and the locality of *B. australis* in the N. Transvaal.

Balanites dawei Sprague, Kew Bull. **1913**: 140. 1913.

Chikwawa District: Chikwawa, in *Acacia albida* woodland, tree 20 m. high and 75 cm. in diameter, flowers green, few buds open, 200 m., Oct. 3, 1946, *17924*. Portuguese East Africa and now new to Nyasaland.

I very much doubt whether *B. maughamii* Sprague (Kew Bull. **1913**: 138. 1913) is specifically distinct. The main distinction, according to Sprague, between the two lies in the fruits, lacking in Mr. Brass' specimen; Sprague also gives a very slight difference in the shape of the petals of *B. dawei* and *B. maughamii,* which, if genuine, suggests that *Brass 17924* is better placed under *B. dawei.* More material is wanted.

OCHNACEAE

Ochna leptoclada Oliv. Fl. Trop. Afr. **1**: 318. 1868.

Kota-kota District: Chia area, locally common in sandy woodlands of lake-plains, shrub 30–50 cm. high, deciduous, petals yellow, fugacious, calyx reddish, fruit immature, 480 m., Sept. 1, 1946, *17477*. Belgian Congo, Tanganyika Territory, N. and S. Rhodesia.

Ochna gracilipes Hiern, Cat. Welw. Afr. Pl. 1: 121. 1896; Exell & Mendonça in Carrisso, Consp. Fl. Angol. **1**: 286. 1951.

Kota-kota District: Chintembwe, in rocky grasslands, low bushy shrub 20–30 cm. high, flowers yellow, fruiting calyx red, fruit immature; 1400 m., Sept. 9, 1946, *17588*. Belgian Congo, Tanganyika Territory, Nyasaland, N. and S. Rhodesia, Angola, and South West Africa.

The taxonomy of this and the preceding species is very difficult, and I do not feel at all sure that the above treatment is right. The material available is inadequate. Specimens collected from the same clump so as to show flowers mature leaves and ripe fruit will often require more than one visit, at different seasons; but this is what is badly needed, here and in other genera. At present it is hard to know whether there are several closely related species or one variable one.

I very strongly suspect that, whatever the final taxonomic verdict, *Ochna hillii* Hutch. (Kew Bull. **1921**: 245. 1921) will turn out to be a synonym of *O. gracilipes.* If this is so then the range of *O. gracilipes* is extended to the savannah regions of French Guinea, Ivory Coast, Gold Coast, and Nigeria.

Ochna longipes Bak. Kew Bull. **1897**: 247. 1897.

Ochna shirensis Bak. Kew Bull. **1897**: 247. 1897.

Cholo District: Cholo Mountain, rocky situations in rain-forest, tree 10 m. high, deciduous, young leaves only, flowers yellow, 1400 m., Sept. 20, 1946, *17668*. Kenya, Tanganyika Territory, Nyasaland, S. Rhodesia, and Portuguese East Africa.

MELIACEAE

Turraea robusta Gürke, Bot. Jahrb. **19** Beibl. 47: 34. 1894.

Kota-kota District: Nchisi Mountain, rocky edges of rain-forest, tree 4–6 m. high, flowers brownish, fruit green, aril bright orange, seeds black, 1650 m., July 31, 1946, *17056*. Belgian Congo, Uganda, Kenya, Tanganyika Territory, N. Rhodesia, and now new to Nyasaland.

Trichilia volkensii Gürke, Bot. Jahrb. 19: Beibl. 47: 33. 1894; Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **19B**^{1}: 112. 1940; Staner, Bull. Jard. Bot. Brux. **16**: 146. 1941.

Cholo District: Cholo Mountain, in primary rain-forest, tree 20 m. high and 35 cm. in diameter at breast-height, flowers cream, 1200 m., Sept. 23, 1946, *17765;* ibid., occasional in rain-forest, tree 5–7 m. high, flowers cream-coloured, fragrant, 1200 m., Sept. 25, 1946, *17800.*

Both these gatherings may be referred to var. *genuina* Pic.-Ser. Webbia 7: 334 (1950).

Trichilia roka (Forsk.) Chiov. Flora Somala **2**: 131. 1932.

Elcaja roka Forsk. Fl. Aegypt.-Arab. xcv (nom. s. descr.), 127 no. 100 (cum descr. gen.-specif. sed s. nom.). 1775.

Trichilia emetica Vahl. Symb. Bot. 1: 31. 1790; Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **19B**^{1}: 109. 1940; Staner, Bull. Jard. Bot. Brux. **16**: 175. 1941.

Kota-kota District: Chia area, on bank of a stream in woodland of lake-plain, tree 18 m. high and 40 cm. in diameter, flowers green, native name (Chinyanja) mwavi, 480 m., Sept. 2, 1946, *17503*. Chikwawa District: Lower Mwanza River, on sandy bank of river, tree 15 m. high, flowers cream-coloured, 180 m., Oct. 6, 1946, *18024*. Widespread in tropical Africa, extending to South Africa, Madagascar, Réunion, and Arabia.

Mr. W. G. Dyson has called my attention to this unfortunate name-change. Mr. H. K. Airy-Shaw agrees that the name on one page must be associated with the description on another—the same procedure, incidentally, as that which validates the name *Catha edulis* Forsk.

Trichilia capitata Klotzsch in Peters, Reise Mossamb. Bot. 120. 1861; Harms in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **19B**^{1}: 112. 1940.

Chikwawa District: Lower Mwanza River, frequent on sandy riverbanks, tree 15 m. high, fruit green, seeds black, aril red, 180 m., Oct. 6, 1946, *18006*. Portuguese East Africa and Nyasaland.

OLACACEAE

Strombosia scheffleri Engl. Notizbl. Bot. Gart. Berl. Append. **21**: 4. 1909; Bot. Jahrb. **43**: 166. 1909; Louis & Léonard, Fl. Congo Belge **1**: 270. 1948.

Cholo District: Cholo Mountain, in rain-forest canopy-layer, tree 30 m. high, flowers cream-coloured, 1200 m., Sept. 24, 1946, *17780*. British Cameroons, Portuguese Congo, Belgian Congo, Uganda, Kenya, Tanganyika Territory, Nyasaland, S. Rhodesia, Angola.

This species has been till now unrepresented at Kew from Nyasaland, but is recorded thence in Check Lists For. Trees & Shrubs Brit. Emp. 2 (Nyasaland): 57 (1936).

AQUIFOLIACEAE

Ilex mitis (L.) Radlk. Rep. Brit. Ass. **1885**: 1081. 1886; Act. Congr. Bot. Anvers 172. 1887; Loesener, Nova Acta Acad. Caes. Leop.-Carol. **78**: 240. 1901.

Sideroxylon mite L. Syst. Nat. ed. 12. **2**: 178. 1767.

Mlanje District: Mlanje Mountain; Luchenya Plateau, isolated trees on rocks in grassland, tree 3–5 m. high, of compact habit, diameter at breast-height 20 cm., foliage dark green, twigs purple, fruit red, soft and fleshy, 2200 m., July 3, 1946, *16650*. Eritrea and Uganda, southwards to South Africa; in West Africa confined to Fernando Po and the British Cameroons (the Cameroon Mountain and Bamenda).

CELASTRACEAE

Catha edulis Forsk. Fl. Aegypt.-Arab. cvii (nom.), 63 (descr.). 1775; Davison, Bothalia **2**: 339. 1927; Greenway, E. Afr. Agr. Jour. **13**: 98–102. 1947.

Kota-kota District: Nchisi, common in forest, tree to 20 m. high and 60 cm. in diameter, flowers cream-coloured, 1350 m., Aug. 1, 1946, *17071*. Cholo District: Cholo, common in rain-forest, tree 20–25 m. high and to 40 cm. in diameter, fruit immature, whitish, 1100 m., Sept. 29, 1946, *17873*. Arabia (? introduced here) and Abyssinia, southwards through eastern Africa to South Africa.

Maytenus Mol.

Gymnosporia (Wight & Arn.) Benth. & Hook.

In volume 20B of the second edition of the Natürlichen Pflanzenfamilien (1942) Loesener has taken a rather revolutionary view of the limits of the genera *Gymnosporia* and *Maytenus*, restricting the former to those with spines or short shoots. Consequently a number of African species, till then accepted as *Gymnosporiae*, had to be moved to *Maytenus*. Till then *Maytenus* had been limited to New World species, and separated from *Gymnosporia* by rather vague characters such as the prevalence of uniovulate loculi and bilocular ovaries.

Loesener's new view was a decided improvement on the previous position. Biovulate loculi are neither rare nor accidental in *Maytenus*, witness Urban's key to the West Indian species (Symb. Antill. 5: 53, 54. 1904), where twenty out of twenty-one species are said to have them. Bilocular ovaries are usual in some African species of *Gymnosporia*. There was thus, before Loesener's latest idea, no certain character to separate *Gymnosporia* from *Maytenus*.

The presence or absence of spines or short shoots is, however, so poor a character to separate genera, and is moreover inconstant, that it seems better to merge *Gymnosporia* wholly into *Maytenus*.

Maytenus acuminata (L.f.) Loes. in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **20B**: 138. 1942.

Celastrus acuminatus L. f. Suppl. Pl. 154. 1781.
Celastrus populifolius Lam. Tab. Encyc. **2**: 94. 1797.
Gymnosporia acuminata (L.f.) Szysz. Enum. Polyp. Discifl. Rehm. 33. 1888; Engl. Pflanzenw. Afr. **3**^{2}: 224. 1921; Davison, Bothalia **2**: 311. 1927. Non *G. acuminata* Hook. f. ex Laws. in Hook. f. Fl. Brit. Ind. **1**: 619. 1875.
Gymnosporia populifolia (Lam.) Dümmer, Gard. Chron. III. **54**: 248. 1913.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in primary forest, tree up to about 10 m. high, fruit dehiscent, 1890 m., July 15, 1946, *16843*. Uganda *(Eggeling 3787)*, southwestern Tanganyika Territory ? *(Stolz 2334)*, Nyasaland, and South Africa.

Mr. Brass' specimen has leaves rather larger and proportionately longer than the largest-leaved South African specimens, more rounded at base and more shining above. It does not agree satisfactorily with *Gymnosporia lepidota* Loes., which has been made a variety of *G. acuminata*, but does seem the same as the Uganda and Tanganyika specimens in Herb. Kew. cited above. In any event I do not consider it more than a large-leaved variant of *G. acuminata*.

It should be noticed that if this species is kept in *Gymnosporia* it cannot be called *G. acuminata* (L.f.) Szysz., which is a later homonym; *G. populifolia* (Lam.) Dümmer is the right name under *Gymnosporia*.

Maytenus acuminata (L.f.) Loes. var. **uva-ursi** Brenan, var. nov.

A typo foliis ad apicem obtusis vel nonnunquam subacutis nec acutis vel acuminatis, omnibus pro specie minimis (5–)9–20(–25) mm. longis 4–13 mm. latis obovatis usque ellipticis vel nonnunquam subovatis.

NYASALAND: Mlanje District; Tuchila Plateau, shrub 1.2–1.8 m. high, flowers red, 1830 m., Aug., 1901, *J. M. Purves 76* (Herb. Kew.); Mlanje Mountain; Luchenya Plateau, in forest regrowths, tree or shrub 2–4 m. high, flowers red, fruits red, 2140 m., June 27, 1946, *16465;* ibid., open rocky bed of a forest stream subject to flooding, shrub 1–1.5 m. high, much branched, compact, flowers red, fruit red, 1850 m., July 8, 1946, *16742;* ibid., occasional on rocks in grasslands, shrub up to 1 m. high, flowers red, fruit red, 2200 m., July 11, 1946, *16783* (TYPUS varietatis).

TRANSVAAL: Zoutpansberg District: 5 m. W. of Wylie's Poort, in "fynbosch" [ericoid vegetation], up to 1 m. high, berries reddish, 1520 m., Aug. 22, 1930, *Hutchinson & Gillett 4409* (Herb. Kew.); Hillside, Franz Hoek Farm, small shrublet, very rare, July 12, 1935, *E. E. Galpin 14943* (Herb. Kew.); Happy Rest, vicinity of Louis Trichardt, on berg, small tree, smooth bark, 1220 m., Feb. 27, 1946, *J. Gerstner 6114* (Herb. Kew.).

It seems at first sight absurd to make these plants and *Brass 16843* variants of the same species. In preliminary sorting I considered them obviously distinct species; but the South African material shows such an extraordinary range of leaf-size and habit that one's faith in facies as a specific character totters alarmingly.

The new variety is analogous to *Gymnosporia acuminata* (L.f.) Szysz. var. *microphylla* (Sond.) Davison, but var. *uva-ursi* has the leaves obtuse or sometimes subacute at apex, not acute or acuminate as in var. *microphylla.*

The Nyasaland specimens have leaves ranging from elliptic to narrowly obovate, while the Transvaal ones are elliptic to somewhat ovate. By observing this tendency it is possible to deduce the area where a specimen was collected. The difference is so slight that for the present I think it best to consider them as mere forms of a single variety.

If a leaf is broken across the pieces remain connected by more or less numerous elastic cobwebby threads; the same thing happens whether the plant is living or in the herbarium, and in South Africa this is used as a "spot-character" for *Maytenus acuminata* in its protean forms.

Maytenus cymosa (Soland.) Exell, Bol. Soc. Brot. II. 26: 222. 1952.

Celastrus buxifolius L. Sp. Pl. 197. 1753, pro parte; non *Maytenus buxifolia* Griseb.
Celastrus cymosus Soland. Bot. Mag. *pl. 2070.* 1819.
Gymnosporia buxifolia (L.) Szysz. Enum. Polyp. Discifl. Rehm. 34. 188; Engl. Pflanzenw. Afr. 3^2: 227. *f. 113.* 1921; Davison, Bothalia 2: 317. 1927.

Mlanje District: Likubula Gorge, on termite-mounds in *Brachystegia-Uapaca* woodland, shrub 4–5 m. high, branches thorny, weak and subscandent, flowers white, 840 m., June 20, 1946, *16377.* Widespread from southern Spain through tropical Africa to South Africa.

Maytenus welwitschiana Exell & Mendonça, nom. nov. [A. W. E. & F. A. M.]

Celastrus euonymoides Welw. ex Oliv. Fl. Trop. Afr. 1: 362. 1868; non *Maytenus evonymoides* Reiss.
Gymnosporia euonymoides (Welw. ex Oliv.) Loes. Bot. Jahrb. **17**: 547. 1893.

Kota-kota District: Chenga Hill, occasional on dry rocks, shrub 1–1.5 m. high, petals white, ovary red, 1600 m., Sept. 9, 1946, *17601.* Previously known only from Angola, thus new to Nyasaland; similar plants occur in Tanganyika Territory.

Brass 17601 has rusty-pubescent twigs, leading me to wonder whether it might not be *Gymnosporia ferruginea* Bak., described from Mount Zomba. So I examined the type-specimen of *G. ferruginea* and found, rather surprisingly, a gamopetalous corolla, no stamens at all, despite the fact that Baker mentions them in his description, and a central pubescent quadrilocular ovary with 4 short styles at its apex. Obviously it is not a *Gymnosporia* but a *Euclea* in the family Ebenaceae, and one that does not appear to have a name; a new name is therefore suggested.

Euclea bakerana Brenan, nom. nov.

Gymnosporia ferruginea Bak. Kew Bull. 1897: 247. 1897; non *Euclea ferruginea* Bernh. Flora 27: 825. 1844.

Whyte s.n. (Mount Malosa, 1220–1830 m., Nov.-Dec. 1896) and *Buchanan 215* (top of Mount Zomba), both at Kew, are also *Euclea bakerana.* The appearance of the specimens suggests that it is a suffrutex, although there is no direct evidence on this, beyond "1½–2 ft.," written on Buchanan's label.

Maytenus putterlickioides (Loes.) Exell & Mendonça, comb. nov. [A. W. E. & F. A. M.]

Gymnosporia putterlickioides Loes. Bot. Jahrb. 17: 544. 1893; Engl. Pflanzenw. Afr. 3^2: 228. 1921.

Chikwawa District: Chikwawa, in dry brushy forest of elevated river-plain, shrub 2 m. high, flowers white, 200 m., Oct. 2, 1946, *17907;* ibid., occasional in dry brushy forest of high river-banks, shrub about 2 m. high, = *17907,* flowers white, fruit inflated, immature, 200 m., Oct. 3, 1946, *17925.* Kenya, Tanganyika Territory, Nyasaland, and Angola.

This may be no more than varietally distinct from *M. welwitschiana* Exell & Mendonça.

Maytenus senegalensis (Lam.) Exell, Bol. Soc. Brot. II. 26: 223. 15 September 1952; F. W. Andrews, Fl. Pl. A.-E. Sudan 2: 281. October 1952.

Celastrus senegalensis Lam. Encyc. 1: 661. 1784.
Gymnosporia senegalensis (Lam.) Loes. Bot. Jahrb. 17: 541. 1893.

Chikwawa District: Lower Mwanza River, in sandy woodlands, shrub 4 m. high, 180 m., Oct. 6, 1946, *18007.* The species is widespread in tropical Africa and most variable.

Pterocelastrus galpinii Loes. Bot. Jahrb. 41: 308. 1908; Davison, Bothalia 2: 321. 1947.

Gymnosporia nyasica Burtt Davy & Hutch. in Burtt Davy, Man. Fl. Pl. Transvaal 2: 23. 1932.

Mlanje District: Mlanje Mountain, south-west ridge, in elfin wood in shelter of rocks on summit, tree 4 m. high, branches stiff, erect, branches, petioles, and peduncles red, flowers cream-coloured, 2400 m., June 28, 1946, *16523.* Nyasaland and the Transvaal.

The type-specimen of *Gymnosporia nyasica* has undoubtedly the facies of a *Pterocelastrus,* and in addition the developing ovaries show clear indications of numerous processes starting to grow out. The leaves of *16523* are broader than those on the type-specimen of *Pterocelastrus galpinii,* but I do not consider the Nyasaland plant specifically separable.

Mystroxylon aethiopicum (Thunb.) Loes. in Engl. & Prantl, Nat. Pflanzenf. Nachtr. 1: 223. 1897.

Cassine aethiopica Thunb. Fl. Cap. 2: 227. 1818; Davison, Bothalia 2: 330. 1927.

North Nyasa District: Nyika Plateau, edges of juniper forest, tree 6 m. tall, flowers green, fruit fleshy, red, 2250 m., Aug. 11, 1946, *17160.* A.-E. Sudan, southwards through eastern Africa and the Belgian Congo to Angola and South Africa.

Mystroxylon aethiopicum (Thunb.) Loes. var. **pubescens** (Oliv.) Brenan, Kew Bull. 1949: 75. 1949.

Mystroxylon burkeanum Sond. in Harv. & Sond. Fl. Cap. 1: 470. 1859–1860.
Elaeodendron aethiopicum (Thunb.) Oliv. var. *pubescens* Oliv. Fl. Trop. Afr. 1: 365. 1868.

Cassine burkeana (Sond.) Kuntze, Rev. Gen. Pl. 1: 114. 1891; Davison, Bothalia 2: 329. 1927.

Kota-kota District: Chia area, banks of waterholes in dry woodland of lake-plain, tree 6–8 m. high, flowers green, 480 m., Sept. 3, 1946, *17516*. The variety in the A.-E. Sudan, Uganda, Kenya, Tanganyika Territory, Nyasaland, S. Rhodesia, Angola, and the Transvaal.

Hippocratea goetzei Loes. Bot. Jahrb. **30**: 346. 1901; Engl. Pflanzenw. Afr. 3^2: 242. 1921.

Hippocratea scheffleri Loes. Bot. Jahrb. **34**: 115. 1904.

Cholo District: Cholo Mountain, in primary rain-forest, vine 15 m. high, climbing by sensitive branchlets, flowers green, 1300 m., Sept. 20, 1946, *17684*. Uganda, Kenya, Tanganyika Territory, and now new to Nyasaland.

RHAMNACEAE

Ziziphus abyssinica Hochst. ex A. Rich. Tent. Fl. Abyss. **1**: 136. 1847; Brenan, Check-Lists For. Trees & Shrubs Brit. Emp. 5^2: 469. 1949.

Kasungu District: Kasungu, in *Brachystegia* woodlands, tree or shrub 5–6 m. high, fruits reddish-brown, sweetish, native name (Chinyanja) kankande, 1000 m., Aug. 24, 1946, *17413*. Widely distributed in tropical Africa.

Rhamnus prinoides L'Hérit. Sert. Angl. 6. 1788; *pl.* 9. 1790.

Zomba District: Zomba Plateau, frequent in rain-forest fringing streams, shrub 4–5 m. high, leaves convex, very smooth and shining above, pale and dull beneath, flowers green, very inconspicuous, fruit reddish, only one seen, 1500 m., June 7, 1946, *16308*. Mlanje District: Mlanje Mountain; Luchenya Plateau, in rain-forest regrowths, tree 3–4 m. high, leaves stiff, convex, very smooth and glossy above, flowers green, fruits red, 1860 m., June 26, 1946, *16439;* ibid., west slopes, common in bushy second-growth forest, tree 3–4 m. high, leaves dark and glossy above, flowers brown, fruits red (few), 1650 m., July 18, 1946, *16877*. Abyssinia to the Cape, extending westwards to Angola and Bamenda in the British Cameroons.

Scutia myrtina (Burm. f.) Kurz, Jour. As. Soc. Beng. **44**^{2}: 168. 1875; var. **oblongifolia** Engl. Bot. Jahrb. 19 Beibl. 47: 37. 1894.

Cholo District: Cholo Mountain, in secondary rain-forest, vine 10 m. high, flowers greenish, 1200 m., Sept. 22, 1946, *17742*. The species in eastern Africa from Uganda southwards to Portuguese East Africa and N. Rhodesia (new to Nyasaland); also occurring in Madagascar, Mauritius, the Seychelles, India, Burma, and Siam.

Phylica tropica Bak. Kew Bull. **1898**: 302. 1898; Pillans, Jour. S. Afr. Bot. 8: 28. 1942.

Mlanje District: Mlanje Mountain; Luchenya Plateau, one example amongst rocks in grassland, shrub 2 m. high, branches erect, purplish, flowers reddish-brown, fruit red, more or less fleshy, 2240 m., July 3, 1946, *16652;* ibid., common locally in sheltered grasslands, shrub 2–2.5 m. high, branches few, erect, leaves grey beneath, margins revolute, flowers brownish-red, fruit red, 1890 m., July 8, 1946, *16739*. Nyasaland and S. Tanganyika Territory.

Gouania longispicata Engl. Pflanzenw. Ost-Afr. C: 256. 1895; M. L. Green, Kew Bull. **1916**: 198. 1916.

Cholo District: Cholo Mountain, common in rain-forest regrowths, vine up to 10 m. high, fruits immature, 1200 m., Sept. 21, 1946, *17705*. Uganda to S. Rhodesia and Nyasaland, also in the Belgian Congo.

VITACEAE

Rhoicissus erythrodes (Fresen.) Planch. in DC. Monogr. Phan. 5: 465. 1887; Gilg & Brandt, Bot. Jahrb. 46: 440. 1911.

Vitis erythrodes Fresen. Mus. Senckenb. 2: 284. 1837.

Zomba District: Zomba Plateau, frequent on rocky ground in *Brachystegia* woodlands, vine 1–2 m. high, 1500 m., June 8, 1946, *16324*. Widespread in tropical Africa, extending to Arabia and South Africa.

SAPINDACEAE[20]

Allophylus chaunostachys Gilg, Bot. Jahrb. **30**: 349. 1901; Radlk. Pflanzenreich **98b** (4^{165}): 524. 1932.

North Nyasa District: Nyika Plateau, undergrowth of montane forest of escarpment, tree 6 m. high, flowers green, stamens white, 2100 m., Aug. 17, 1946, *17293*. Recorded also from Kinga Mountains (type) and from Kyimbila District in S. Tanganyika, close to the Nyasaland frontier.

Allophylus buchananii Gilg & Radlk. Sitz.-Ber. Bayer. Akad. **38**: 219. 1908; Radlk. Pflanzenreich **98b** (4^{165}): 524. 1932.

Zomba District: Zomba Plateau, undergrowth of riverine rain-forest, tree 3 m. high, leaves thin, very dark green above, paler below, flowers white, 1400 m., May 28, 1946, *16051*. Cholo District: Cholo Mountain, frequent in rain-forest undergrowth, tree 4–6 m. high, fruit red, fleshy, globose, 1300 m., Sept. 24, 1946, *17782*. Apparently confined to Nyasaland; specimens from Kenya and Tanganyika have been wrongly named *A. buchananii.*

Allophylus sp. nr. **buchananii** Gilg ex Radlk.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common canopy tree in primary forest, tree up to about 30 m. high, flowers white, fruit immature, 1890 m., July 12, 1946, *16802*.

Stature and the coarse, subcoriaceous texture of the leaves distinguish this species from *A. buchananii;* the inflorescences are also longer and more robust, and the twigs more prominently lenticellate than in that species. The specimen cannot be identified with any material at Kew, but, without seeing types in continental herbaria, it would be unwise to add another name to the already overburdened list of *Allophylus* species.

Deinbollia xanthocarpa (Klotzsch) Radlk. Sitz.-Ber. Bayer. Akad. **8**: 304, 369. 1878; Pflanzenreich **98c** (4^{165}): 676. 1932.

Sapindus xanthocarpus Klotzsch in Peters, Reise Mossamb. Bot. 119. 1861.

Chikwawa District: Chikwawa, in dry brushy forest of river plain, shrub 1.5 m. high, flowers white, 200 m., Oct. 2, 1946, *17904*. Portuguese East Africa and Nyasaland.

Dodonaea viscosa (L.) Jacq. Enum. Pl. Carib. 19. 1760; Radlk. Pflanzenreich **98g** (4^{165}): 1363. 1933.

Ptelea viscosa L. Sp. Pl. 118. 1753.

Zomba District: Zomba Plateau, in rain-forest regrowths, not common, tree 6 m. high, 1500 m., June 7, 1946, *16305*. Mlanje District: Mlanje Mountain, west slopes, occasional in second growths of montane forest, tree up to about 8 m. high, 1850 m., July 18, 1946, *16868*. North Nyasa District: Nyika Plateau, in edges of montane forest on escarpment, shrub 2–3 m. high, fruits reddish, 2100 m., Aug. 17, 1946, *17276*. Tropical and subtropical regions of the whole world.

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[20] *Allophylus* by R. D. Meikle, Royal Botanic Gardens, Kew.

Mr. Brass' specimens are referable to the var. *vulgaris* Benth. f. *burmanniana* (DC.) Radlk., as defined by Radlkofer, Pflanzenreich 98g (4^{165}): 1368 (1933).

MELIANTHACEAE[21]

Bersama abyssinica Fresen. Mus. Senckenb. 2: 281. *pl. 17.* 1837; subsp. **abyssinica**; Verdcourt, Kew Bull. **1950**: 237. 1950.

Bersama holstii Gürke, Bot. Jahrb. 19 Beibl. 47: 36. 1894.

Zomba District: Zomba Plateau, on river-banks in rain-forest, one example seen, tree 5 m. high, flowers not seen, fruit purple-red, 1450 m., June 3, 1946, *16173**. Kota-kota District: Nchisi Mountain, on rain-forest borders, tree 10 m. high, flowers white, 1600 m., Sept. 10, 1946, *Anthony 17613*. Cholo District: Cholo Mountain, occasional in rain-forest secondary growths, tree 5–6 m. high, sparsely branched, leaves up to 50 cm. long, flowers cream-coloured, 1200 m., Sept. 25, 1946, *17797*.

Verdcourt, Kew Bull. **1950**: 239 (1950), has the following notes on the above specimens:

(i) Form close to *B. holstii* Gürke—see Kenya (i). Leaves 7-jugate, sessile, with petiolules 2–3 mm. long. Flowers small. Calyx brownish with less hair than other forms. *Brass* 17797 (Nyasaland).

(ii) Forms rather similar to typical *abyssinica* but with leaves of very various sizes. *Anthony 17613, Brass 16173* (Nyasaland). There is incomplete material from Nyasaland and Northern Rhodesia which belongs here in all probability.

Bersama abyssinica Fresen. subsp. **paullinioides** (Planch.) Verdcourt, Kew Bull. **1950**: 237. 1950.

Natalia paullinioides Planch. in Hook. Fl. Niger 252. 1849.
Bersama nyassae Bak. f. Jour. Bot. 45: 19. 1907.

Zomba District: Zomba Plateau, in exposed rocky situations, tree 6–7 m. high, fruits unripe, seeds red, 1500 m., June 2, 1946, *16163*.

B. zombensis Dunkley is said to be a very large timber tree, it has leaflets with golden hairs, but is very close to the above and may be a growth stage of it.

Bersama sp.

Leaves and inflorescences too young.

Kota-kota District: Nchisi Mountain, frequent in brushy forest, tree or shrub 2–4 m. high, young leaves bronze-green, buds only, fruit strongly ridged, brown, pubescent, seeds red, 1400 m., July 30, 1946, *17032*.

ANACARDIACEAE[22]

Rhus longipes Engl. in DC. Monogr. Phan. **4**: 431. 1883; Hiern, Cat. Welw. Afr. Pl. **1**: 192. 1896. Engl. Pflanzenw. Afr. 3^2: 212. 1921.

[*Rhus villosa* (non L.f.) Oliv. Fl. Trop. Afr. 1: 439. 1868, pro parte; et auct. mult.]
Rhus huillensis Engl. Bot. Jahrb. **24**: 501. 1898, pro parte; Exell, Jour. Bot. 66 suppl. 1: 92. 1928, pro parte.
Rhus ruzizensis Engl. Pflanzenw. Afr. 3^2: 211. 1921.

North Nyasa District: Nyika Plateau, common in edges of juniper forest, tree or shrub to 6 m. high, flowers green, fruit immature, red, 2350 m., Aug. 11, 1946, *17178*. Widely spread through tropical Africa from Angola and S. Rhodesia to Kenya, though apparently absent from Abyssinia, Sudan, and N. W. tropical area.

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[21] Determinations all by Mr. B. Verdcourt, East African Agricultural and Forestry Research Organisation, Nairobi, Kenya.

[22] *Rhus, Heeria* by R. D. Meikle, Royal Botanic Gardens, Kew.

Rhus longipes Engl. **var. grandifolia** (Oliv.) Meikle, comb. nov.

Rhus villosa L. f. var. *grandifolia* Oliv. Fl. Trop. Afr. 1: 439. 1868; Engl. in DC. Monogr. Phan. 4: 425. 1883; Pflanzenw. Afr. 3²: 209. 1921.

Kota-kota District: Nchisi Mountain, common amongst rocks in *Brachystegia* woodland, shrub 3–5 m. high, weak, subscandent habit, flowers greenish, fruit red (immature), 1400 m., July 24, 1946, *16888*. Distribution seems to be more or less the same as that of typical *R. longipes.*

This species has been confounded and obscured in a most remarkable manner. True *Rhus villosa* L.f. (*R. incana* Mill.) from S. Africa is quite distinct, with a different habit and indumentum, and with thick, coriaceous, blunt, obovate or spathulate leaflets. Moreover, so far as tropical African material is concerned, it can be shown that the epithet *villosa* (or *incana*) has been applied indiscriminately to several perfectly distinct species. Engler (in DC. Monogr. Phan. 4: 431. 1883) first correctly identified our plant as a distinct species, under the name *Rhus longipes,* but he seems to have overlooked the importance of the distinction by continuing to cite tropical African specimens, conspecific with his *R. longipes,* under the epithet *villosa.* Furthermore (Bot. Jahrb. 24: 501. 1898) he adds to the confusion by publishing a new name, *R. huillensis,* and referring to it two Welwitsch specimens, one of which *(Welwitsch 4412)* is identical with *R. longipes,* the other *(Welwitsch 4415)* is quite a different species. This unfortunate error has been repeated in the Gossweiler Catalogue (Jour. Bot. 66 suppl. 1: 92. 1928). Engler may have realized his mistake, for later (Pflanzenw. Afr. 3²: 1921) he appears to restrict the epithet *huillensis* to the small-leaved species represented by *Welwitsch 4415* (a variety of *R. quartiniana* A. Rich.), though he continues to apply the epithet *villosa* to tropical African material.

R. ruzizensis Engl. is, I think, identical with *R. longipes* Engl., and the name should be rejected as a later synonym.

The name *Rhus inamoena* Standl. has crept into several check-lists of African trees and shrubs, but I have not been able to trace any description and suspect that it is merely a manuscript name copied from an herbarium label; many of the specimens so named are referable to *R. longipes.*

R. longipes Engl. is undoubtedly a very variable species, though it is likely that many of the variants will prove to be states or growth-phases rather than varieties in the proper taxonomic sense; var. *grandifolia* with its large, broad leaflets and softly villose shoots is, however, fairly readily distinguished from the type, though it must be admitted that intermediates do occur and that the villosity of the stems is a great deal more obvious in young flowering specimens than in mature fruiting material.

Rhus monticola Meikle, sp. nov.

R. chirindensi Bak. f. affinis, sed statura humiliore, ramis mox glabrescentibus, foliolis eleganter reticulato-venulosis valde differt.

Frutex parvus circiter 1 m. altus; rami flexuosi, juventute pilis albis caducis dense obtecti, mox glabrescentes, leviter lenticellati, cortice brunneo-rufescenti. *Petioli* validi usque 6 cm. longi, parce pilosi, supra valde applanati vel leviter canaliculati. *Foliolum terminale* obovatum vel ellipticum, usque 8 cm. longum et 3.5 cm. latum, ad basin in petiolulum ± alatum usque 8 mm. longum sensim coarctatum, ad apicem in cuspidem acutam usque 8 mm. longam attenuatum; lamina siccitate brunnea vel olivacea, margine arte recurvata, integerrima; costa utrinque prominens, nervi laterales 12–20, prominentes, adscendentes, ad marginem conjuncti, venae et venulae eleganter reticulatae; foliola lateralia similia, breviora, usque 7 cm. longa et 2.8 cm. lata. *Inflorescentia* terminalis, albo-pilosa, multiramulosa, usque 10 cm. longa. *Flos* ♂ virescens, glaber, breviter

pedicellatus, usque 3.5 mm. diametro; sepala ovata, obtusa, circiter 1 mm. longa et 0.8 mm. lata; petala ovata, obtusa, obscure nervosa, usque 1.5 mm. longa et 1.0 mm. lata; discus valde crenatus, usque 1.2 mm. diametro; stamina 5, filamentis glabris usque 1 mm. longis; antherae albidae, 0.8 mm. longae et 0.5 mm. latae. *Flos* ♀ et fructus non visi.

Mlanje District: Mlanje Mountain, 2700 m., March, 1897, *Adamson 351;* Luchenya Plateau, rocky situations in grassland, shrub about 1 m. high, flowers greenish, 2000 m., July 3, 1946, *16656* (TYPUS in Herb. Kew.).

The sharply cuspidate, petiolulate leaflets place this species near *R. chirindensis* Bak. f. and *R. legati* Schönl., but these are both large shrubs or small trees, with leaflets lacking the elegant reticulate venation which is such an obvious feature in dried material of *R. monticola.* The species would appear to be endemic to Mlanje Mountain.

Rhus amerina Meikle, sp. nov.

R. lanceae L. f. affinis, sed foliolis latioribus, leviter nervosis nec prominenter reticulatis, fructibus valde compressis brunneis vel ferrugineis differt.

Arbor parva usque 4-6 m. alta; rami graciles, juventute glaberrimi vel minute pubescentes, mox glabrescentes, cortice brunneo vel brunneo-rufescente, maturitate cinereo, prominenter lenticellato. *Petioli* tenues, subteretes vel supra leviter applanati, vix canaliculati, glabri, usque 5 cm. longi. *Foliolum terminale* glaberrimum, rigide chartaceum, lineari-lanceolatum vel lanceolatum, usque 9.5 cm. longum et 3 cm. latum, ad basin sensim angustatum, longe acuminatum, ad apicem mucronatum vel muticum; lamina siccitate brunnea vel cinerea, margine integra vel irregulariter undulato-crenata; costa utrinque prominens, nervi laterales circiter 20–30 adscendentes nec impressi nec valde prominentes; foliola lateralia similia, breviora, usque 7.5 cm. longa et 1.8 cm. lata. *Inflorescentiae* axillares et terminales, laxae, multiramulosae, glabrae vel parce puberulae, usque 12 cm. longae. *Flos* ♀ circiter 2.5 mm. diametro, glaber, albus; sepala ovata, obtusa, usque 0.8 mm. longa et 0.5 mm. lata; petala ovata, obtusa, obscure nervosa, usque 1 mm. longa et 0.6 mm. lata; discus crenulatus, glaber, circiter 1 mm. diametro; ovarium compressum, usque 1 mm. latum, glabrum vel minute puberulum; stamina rudimentaria 5, vix 0.5 mm. longa. *Flos* ♂ circiter 2 mm. diametro, glaber, albus; sepala minuta, usque 0.5 mm. longa, obtusa; petala anguste ovata, obtusa, usque 1 mm. longa et 0.5 mm. lata; stamina 5, filamentis glabris usque 0.5 mm. longis; antherae 0.2 mm. longae et 0.3 mm. latae; discus glaber, crenulatus, circiter 0.3 mm. latus. *Fructus* reniformis, circiter 5 mm. latus et 4 mm. longus, valde compressus, laevis, nitidus, brunneus vel ferrugineus.

NYASALAND: Kasungu District: Kasungu Hill, frequent on rocky slopes, tree 4–6 m. high, fruit reddish-brown, 1100 m., Aug. 28, 1946, *17451.*

S. RHODESIA: Matopo District: Matopos, Sept. 10, 1905, *Burtt-Davy 1352;* ibid., August, 1930, *Hutchinson 4140* (TYPUS in Herb. Kew.); ibid., bushy tree, 1500 m., Sept. 4, 1947, *Wild 1988* (Gov. Herb. Salisbury 17224). Umtali District: Odzani River Valley, 1915, *Teague 414.* Salisbury District: Salisbury, loosely spreading tree, flower white, April 15, 1922, *Eyles 3406;* ibid., March 30, 1929, *Eyles 6323.* Insiza District: Filabusi, Patrick's Dam, small tree, 1200 m., Feb., 1949, *Davies D 253* (Gov. Herb. Salisbury 23250).

BECHUANALAND PROTECTORATE: Lobatsi, Government farm, 1300 m., August, 1940, *Miller B1204.*

TRANSVAAL: Waterberg District: Naboomfontein, 1430 m., Jan. 23, 1894, *Schlechter 4305.* Rustenburg District: Rustenburg, small tree, 2 m. high, flower green, seeds eaten by Kaffirs when ripe, Feb. 13, 1904, *Nation 167;* Magata's Nek near Rustenburg, Feb. 6, 1929, *Hutchinson 2917.* Pretoria District: Pretoria, Wonderboom Farm, 1350 m., Aug. 6, 1904, *Burtt-Davy 2281.* Pietersburg District: Matok, Aug. 24, 1930, *Hutchinson & Gillett*

4473; ? without locality, Mar. 20, 1906, *Grenfell 14, 16.* Barberton District: Avoca near Barberton, 500 m., July, 1931, *Thorncroft 3060.* Wolmaransstad District: Makwassie Spruit near Wolmaransstad, c. 1700 m., Mar. 3, 1935, *Liebenberg 3410.*

CAPE PROVINCE: Vryberg District: Vryberg, 1220 m., April 11, 1921, *Mogg 8917.*

I am satisfied that the Transvaal specimens cited by Engler, Schönland and other authors under the name *R. gueizzii* Sond. are specifically distinct from type-material of that species (Port Natal, *Gueinzius s.n.* in Herb. Kew.). Schönland (Bothalia 3: 79. 1930) has evidently confused a Gerrard specimen with the Gueinzius type, for he refers to the latter as *Gueinzius 1395*, whereas the type is *sine numero*, he also comments: "Drupe in type subglobose, verrucose...," but the type of *R. gueinzii* consists solely of three male flowering shoots. *Gerrard 1395* is probably intended: this is a fruiting specimen intermediate in character between *R. gueinzii* and *R. crispa* (Engl.) Harv. ex. Schönl. I very much doubt if *R. crispa* can be distinguished from *R. gueinzii*, even as a variety. The undulation of the leaf-margin is a variable character, and is present to a greater or lesser degree in both species. True *R. gueinzii* Sond. differs from *R. amerina* in having the young twigs white or pale-grey, not brown or reddish; the leaflets are obtuse at the apex, and turn black or blackish on drying. The fruits of *R. gueinzii* are subglobose and ± verrucose, those of *R. amerina* are strongly compressed and glossy.

I have not seen specimens of *R. gueinzii* Sond. var. *brevifoliolata* Burtt-Davy (Kew Bull. 1921: 51. 1921); from the description, the variety would appear to be allied to *R. amerina* rather than to true *R. gueinzii.*

Heeria reticulata (Bak. f.) Engl. Pflanzenw. Afr. 3^2: 197. 1921.

Heeria insignis (Del.) Kuntze var. *reticulata* Bak. f. Jour. Bot. 37: 428. 1899.

Kasungu District: Kasungu Hill, occasional on rocky slopes, tree about 8 m. high, sap milky, fruit black, 1100 m., Aug. 28, 1946, *17453.* Recorded from Portuguese East Africa, Nyasaland, N. and S. Rhodesia, Tanganyika, and (doubtfully) Kenya.

The proper status of *Heeria reticulata* is not easily decided. Extreme forms with very prominent tertiary venation and dense woolly indumentum are distinct enough, but as one travels north of the Rhodesias the differences between this species and *H. insignis* (Del.) Kuntze are less apparent, and some of the Kenya specimens might be referred with equal justification to either species. For the present, I am content to follow Engler, and treat *H. reticulata* as a species; it is clear that this particular problem is one which can be solved only with the co-operation of the field-worker.

Sorindeia madagascariensis Thou. ex DC. Prodr. 2: 80; Perrier de la Bâthie in Humbert, Fl. Madag. 114: 26. 1946.

Cholo District: Nswadzi River, in riverine rain-forest, tree 10 m. high, panicles numerous, pendent, on branchlets below the terminal cluster of leaves, flowers orange-coloured, 840 m., Sept. 29, 1946, *17864.* Kenya to Nyasaland and Portuguese East Africa, also in Madagascar and the Mascarenes.

I cannot see that *S. obtusifoliolata* Engl. Pflanzenw. Ost-Afr. C: 244 (1895) differs specifically from *S. madagascariensis.* In Pflanzenw. Afr. 3^2: 190 (1921), Engler keys out *S. obtusifoliolata* by its oblong-obovate scarcely pointed leaflets, but I find the shape very variable indeed both in Madagascar and in the plants from continental Africa.

Lannea edulis (Sond.) Engl. in Engl. & Prantl, Nat. Pflanzenf. Nachtr. 1: 213. 1897.

Odina edulis Sond. in Harv. & Sond. Fl. Cap. 1: 503. 1860.

Kasungu District: Kasungu, in *Brachystegia* woodlands, shrub 10–25 cm. high, several short stout leafless stems erect from a large stock, surrounded by last season's leaves lying on the ground, petals yellow, calyx red, fruit immature, 1000 m., Aug. 25, 1946, *17421*. Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, N. and S. Rhodesia, and the Transvaal; no specimens from Nyasaland up till now in Herb. Kew., but recorded in Check-Lists For. Trees & Shrubs Brit. Emp. 2: 29. 1936.

LEGUMINOSAE

Lotononis laxa Eckl. & Zeyh. Enum. Pl. Afr. Austr. 177 (1836) var. **multiflora** Dümmer, Trans. Roy. Soc. S. Afr. 3: 315. 1913.

Kota-kota District: Chenga Hill, common in open low *Brachystegia* woodland, perennial herb, grey-pubescent, rootstock woody, thick, young shoots flowering after burning of the grass, flowers yellow, later red, 1600 m., Sept. 9, 1946, *17589*.

Both the typical plant and the variety, which is only doubtfully worth distinguishing, were at first known only from South Africa. There are at Kew several gatherings of the typical plant made since 1914 in Kenya and Tanganyika Territory, and of the variety from Tanganyika Territory and Karamoja in Uganda. I believe it to be native and not an introduction in these places. Mr. Brass' Nyasaland record, which is the first from that country, stands geographically between Tanganyika and the South African area.

Crotalaria glauca Willd. Sp. Pl. 3: 974. 1803; Bak. f. Jour. Linn. Soc. Bot. 42: 259. 1914; Leg. Trop. Afr. 25. 1926; Verdoorn, Bothalia 2: 415. 1928.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, one plant seen, annual herb 60 cm. high, flowers green, fruit inflated, 1430 m. May 30, 1946, *16091**; one example in *Brachystegia* woodlands, herb, stem and pods glaucous, flower not seen, 1500 m., June 7, 1946, *16319**. Widely distributed in tropical Africa.

Crotalaria anthyllopsis Welw. ex Bak. in Oliv. Fl. Trop. Afr. 2: 15. 1871; Bak. f. Jour. Linn. Soc. Bot. 42: 263. 1914; Leg. Trop. Afr. 26. 1926; Verdoorn, Bothalia 2: 414. 1928.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 10–30 cm. high, with compact bushy habit, leaves greyish beneath, 1100 m., June 17, 1946, *16338*. Abyssinia, Uganda, Kenya, Tanganyika Territory, Nyasaland, N. and S. Rhodesia, and Angola, also on the Bauchi Plateau in northern Nigeria and (fide Bak. f.) in the Congo.

Crotalaria cephalotes Steud. ex A. Rich. Tent. Fl. Abyss. 1: 156. 1847; Bak. f. Jour. Linn. Soc. Bot. 42: 276. 1914; Leg. Trop. Afr. 28. 1926; Verdoorn, Bothalia 2: 384. 1928.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 15 cm. high, standard brownish, wings and keel yellow, 1000 m., May 24, 1946, *Vernay 16025**. Widely distributed in tropical Africa.

Crotalaria nyikensis Bak. Kew Bull. 1897: 250. 1897; Bak. f. Jour. Linn. Soc. Bot. 42: 280. 1914; Leg. Trop. Afr. 29. 1926; Verdoorn, Bothalia 2: 402. 1928.

Crotalaria kyimbilae Harms, Bot. Jahrb. 54: 380. 1917; Bak. f. Leg. Trop. Afr. 29. 1926.

Kota-kota District: Nchisi Mountain, amongst rocks in *Brachystegia* woodland, herb 70 cm. high, flowers yellow, 1400 m., July 24, 1946, *16895**. Southwestern Tanganyika Territory and Nyasaland (where previously known only from the Nyika Plateau).

Crotalaria aculeata De Wild. Ann. Mus. Congo Bot. IV. 185. *pl. 46, f. 18–28.* 1903; Verdoorn, Bothalia 2: 413. 1928.

Crotalaria spinosa [non Hochst. ex Benth.] Benth. Lond. Jour. Bot. 2: 576. 1843, pro parte, quoad spec. *Kotschy 552.*

Crotalaria spinosa Hochst. ex Benth. var. *pubescens* Benth. Lond. Jour. Bot. 2: 576. 1843.

Ononis emarginata Boj. ex Benth. Lond. Jour. Bot. 2: 576. 1843, pro syn.

Crotalaria spinosa Hochst. ex Benth. subsp. *aculeata* (De Wild.) Bak. f. Jour. Linn. Soc. Bot. 42: 312. 1914; Leg. Trop. Afr. 37. 1926.

Chikwawa District: Lower Mwanza River, scattered on sandy beaches, herb 60 cm. high, flowers yellow, pods inflated, 180 m., Oct. 6, 1946, *18020*. Anglo-Egyptian Sudan, Belgian Congo, Uganda, Tanganyika Territory, Nyasaland, N. Rhodesia, Angola, and Madagascar.

This is a member of a taxonomically most difficult complex. According to E. G. Baker's view *C. aculeata* is a subspecies of *C. spinosa* Hochst. (ex Benth. Lond. Jour. Bot. 2: 576. 1843); with this I disagree, since I am quite unable to find those intermediates that, according to Baker (Jour. Linn. Soc. Bot. 42: 312. 1914), connect the two. Baker was perhaps influenced by the fact that Bentham *(l.c.)* cited two specimens under *C. spinosa*—*Schimper 150*, which is the type-number, and *Kotschy 552*, which is certainly *C. aculeata* De Wild.

True *C. spinosa* is distinguished from all forms of *C. aculeata*, firstly by its very small flowers 4–6 mm. long—the distance from the bend in the keel to the tip is only 4–4.5 mm.; and secondly by the small pods 6.5–8(–9) mm. long and 3.5–5 mm. in diameter. The calyx is only 2.5–4 mm. long with lobes 1.5–2 mm. long.

In a single specimen only, *Rounce 52* (Tanganyika Territory, Kasulu), lacking ripe pods, the length from the bend in the keel to the tip is up to 6 mm. long, but even this is less than the shortest-flowered *C. aculeata*.

True *C. spinosa* is found in Socotra, Eritrea, Abyssinia, Uganda, Kenya, and Tanganyika Territory with an isolated occurrence in Angola (*Welwitsch 1908*, in Herb. Kew), and on the whole seems a constant and distinct plant. It appears to be absent from Madagascar, but occurs in Socotra.

With *C. aculeata* the story is very different. It is easily separable from *C. spinosa* by its much larger flowers and pods. The corolla is 9–10 or occasionally up to 20 mm. long, and the distance from the bend in the keel to its tip is 8–10 (–15) mm. The pods vary between 9 and 30 mm. in length, and 5 and 15 mm. in width.

The commonest and smaller-flowered forms of *C. aculeata* have corollas about 9–10 mm. long, and the length of the keel from bend to tip 8–10 mm.; the calyx is 4.5–5 mm. long with lobes 1.5–2.5 mm. long. Flowers of this size can produce pods ranging from 9–21 mm. in length and 5–9 mm. in width. *C. claessensii* De Wild. (Bull. Jard. Bot. Brux. 3: 271. 1911; Ann. Mus. Congo Bot. V. 3: 410. 1912) seems to me only a form with pods near the upper limit of size.

The common small-flowered forms of *C. aculeata* range from the Anglo-Egyptian Sudan southwards to Angola. In the southern part of this area, particularly N. Rhodesia and the southern Congo, forms with larger corollas occur. These are inconstant and most perplexing. *Mrs. Macaulay 627*, from Mumbwa in N. Rhodesia is an extreme with flowers up to 20 mm. long, and the keel 14–15 mm. from bend to tip; the pod reaches about 30 mm. in length and about 10 mm. in breadth. This plant is the type of *C. spinosa* var. *macrocarpa* Bak. f. The description of *C. kapiriënsis* De Wild. (Bull. Jard. Bot. Brux. 5:23. 1915) reads so similarly that I feel it must be the same thing. But these are extremes. In *J. D. Martin 610* from N. Rhodesia the pods are only 20–25 mm. long, and specimens such as *Quarrè 3161, Milne-Redhead 730*, and *Kassner 2713* show gradual reduction in flower-size to that of normal *C. aculeata*.

I cannot help suspecting that *C. kapiriënsis* may be a distinct species freely crossing with *C. aculeata*; at any rate it must be a very marked geographical variant. At present, however, I feel that the correct course is to follow Verdoorn and to include them under *C. aculeata* interpreted in a wide sense. I should add that I can find nothing but size—nothing qualitative in fact—to separate them.

Crotalaria laburnifolia L. Sp. Pl. 715. 1753; Bak. f. Jour. Linn. Soc. Bot. 42: 318. 1914; Leg. Trop. Afr. 38. 1926; Verdoorn, Bothalia 2: 390. 1928.

Zomba District: Zomba Plateau, one example in rain-forest second-growth, herb 2 m. high, leaves thin, dull above, greyish beneath, flowers with keel reddish-brown, wings yellow, and standard yellow inside, brownish outside, fruit blackish-brown, 1500 m., June 7, 1946, *16306*. East Africa, from the Anglo-Egyptian Sudan southwards to the Transvaal; also in tropical Asia.

Brass 16306 has the leaflets rather larger and more acute than usual.

Crotalaria lachnocarpoides Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Berl. **1891**:) 246. 1892; Bak. f. Jour. Linn. Soc. Bot. **42**: 323. 1914; Leg. Trop. Afr. 39. 1926.

Crotalaria valida Bak. Kew Bull. **1897**: 253. 1897.
Crotalaria lachnocarpoides Engl. subsp. *valida* (Bak.) Bak. f. Jour. Linn. Soc. Bot. **42**: 323. 1914.
Crotalaria lachnocarpoides Engl. var. *valida* (Bak.) Verdoorn, Bothalia 2: 395. 1928.

Zomba District: Zomba Plateau, one plant on an open riverbank, woody herb 90 cm. high, erect, with many branches forming a terminal crown, flowers not seen, 1500 m., June 7, 1946, *16311*. Abyssinia and the Anglo-Egyptian Sudan, southwards to Nyasaland and S. Rhodesia.

I cannot maintain *Crotalaria valida* as even varietally distinct from *C. lachnocarpoides*.

Crotalaria caespitosa Bak. Kew Bull. **1897**: 252. 1897; Bak. f. Jour. Linn. Soc. Bot. 42: 335. 1914; Leg. Trop. Afr. 41. 1926; Verdoorn, Bothalia 2: 412. 1928.

Kota-kota District: Nchisi Mountain, confined to hard bare soil in *Brachystegia* wood, perennial herb, stems springing from a thick woody taproot, calyx and lower surface of standard red, 1400 m., Aug. 5, 1946, *17138*. Confined to Nyasaland.

Crotalaria virgulata Klotzsch in Peters, Reise Mossamb. Bot. 56. 1862; Bak. f. Jour. Linn. Soc. Bot. 42: 337. 1914; Leg. Trop. Afr. 42. 1926; Verdoorn, Bothalia 2: 410. 1928.

Blantyre District: Blantyre, in old gardens, herb up to 1 m. high, greyish, flowers yellow and brown, 1100 m., June 18, 1946, *16363*. Portuguese East Africa, Nyasaland, S. Rhodesia, Bechuanaland, and the Transvaal.

It seems barely possible to keep *Crotalaria forbesii* Bak. (in Oliv. Fl. Trop. Afr. 2: 18. 1871) and *C. longistyla* Bak. f. (Jour. Bot. 58: 75. 1920) distinct from *C. virgulata*.

Crotalaria mucronata Desv. Jour. Bot. Desv. II. 3: 76. 1814; Senn, Rhodora **41**: 355. 1939.

Crotalaria striata DC. Prodr. 2: 131. 1825; Bak. f. Jour. Linn. Soc. Bot. 42: 345. 1914; Leg. Trop. Afr. 43. 1926; Verdoorn, Bothalia 2: 399. 1928.

Chikwawa District: Lower Mwanza River, one example on a sandy beach, herb 1 m. high, flowers yellow, pods inflated, 180 m., Oct. 6, 1946, *18021*. Widely distributed in the tropics.

Crotalaria cleomifolia Welw. ex Bak. in Oliv. Fl. Trop. Afr. 2: 43. 1871. Bak. f. Jour. Linn. Soc. Bot. 42: 350. 1914; Leg. Trop. Afr. 45. 1926; Verdoorn, Bothalia 2: 398. 1928.

Zomba District: Zomba Plateau, on bank of a stream in rain-forest, shrub 3 m. high, showy, much branched, leaves grey beneath, flowers yellow, the keel streaked with red, 1500 m., June 7, 1946, *16291*. Widespread in tropical Africa.

Crotalaria chirindae Bak. f. Jour. Linn. Soc. Bot. 42: 377. 1914; Leg. Trop. Afr. 51. 1926; Verdoorn, Bothalia 2: 399. 1928.

Zomba District: Zomba Plateau, occasional on roadside in *Brachystegia* woodlands, herb 1–1.5 m. high, fruit inflated, 1500 m., June 5, 1946, *16242*. Portuguese East Africa, Nyasaland, and S. Rhodesia.

Crotalaria argyrolobioides Bak. Kew Bull. 1897: 249. 1897; Bak. f. Jour. Linn. Soc. Bot. 42: 384. 1914; Leg. Trop. Afr. 52. 1926; Verdoorn, Bothalia 2: 401. 1928.

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, herb about 1 m. high, leaves greyish beneath, flowers yellow, fruit inflated, 1500 m., June 4, 1946, *16226*. Confined to Nyasaland.

Crotalaria rhodesiae Bak. f. Jour. Linn. Soc. Bot. 42: 401. 1914; Leg. Trop. Afr. 56. 1926; Verdoorn, Bothalia 2: 381. 1928.

Dedza District: Dedza, occasional in *Brachystegia* woodland, perennial, subprostrate herb, leaves reddish, young shoots flowering after the burning of the grass, flowers yellow, lower surface of standard orange, 1500 m., Sept. 13, 1946, *17636*. Nyasaland and N. and S. Rhodesia.

Crotalaria natalitia Meisn. Lond. Jour. Bot. 2: 67. 1843; Bak. f. Jour. Linn. Soc. Bot. 42: 410. 1914; Leg. Trop. Afr. 58. 1926; Verdoorn, Bothalia 2: 381. 1928.

Zomba District: Zomba Plateau, frequent on grassy roadsides, herb 1–1.5 m. high, leaves grey beneath, flowers brownish-yellow, fruit much inflated, 1450 m., June 5, 1946, *16257*. Eastern Africa from the Anglo-Egyptian Sudan (Imatong Mountains) southwards to South Africa.

Crotalaria goetzei Harms, Bot. Jahrb. 28: 399. 1900; Bak. f. Jour. Linn. Soc. Bot. 42: 411. 1914; Leg. Trop. Afr. 59. 1926.

Crotalaria rotundicarinata Bak. f. Jour. Linn. Soc. Bot. 42: 396. 1914; Leg. Trop. Afr. 55. 1926; Verdoorn, Bothalia 2: 396. 1928.

Zomba District: Zomba Plateau, grassy edges of forest patches, shrub about 1 m. high, profusely branched, leaves greyish beneath, flowers yellow, ripe fruit blackish, much inflated, 1820 m., May 31, 1946, *16135*. Mlanje District: Mlanje Mountain; Likubula-Tuchila Divide, frequent in forest second-growths along pathways, shrub 2 m. high, flowers yellow, 2000 m., July 9, 1946, *16753*; Luchenya Plateau, occasional in forest second-growths and in neighboring grassland, shrub 2–2.5 m. high, flowers yellow, fruit blackish, 1890 m., July 14, 1946, *16837*. Southwest Tanganyika Territory and Nyasaland.

I find gradations between the foliaceous stipules of *Crotalaria goetzei* and the linear ones of *C. rotundicarinata*, the various gradations sometimes even on the same plant; I am thus unable to maintain the two as distinct species.

Crotalaria sp.

Kota-kota District: Nchisi Mountain, occasional in *Brachystegia* woodland, herb 30–50 cm. high, flowers yellow, 1400 m., July 27, 1946, *16989*.

This appears near *Crotalaria nicholsonii* Bak. f. (Jour. Linn. Soc. Bot. 42: 346. 1914), but is much dwarfer, with shorter inflorescences and short spreading pubescence on inflorescence-axes, pedicels, and calyces. A specimen at Kew appears to be the same (*Whyte s.n.*, Nyika Plateau, 1830–2130 m., July 1896). In absence of further specimens and the pods I do not feel it practicable to determine this plant further.

Crotalaria sp.

Dedza District: Dedza, frequent in *Brachystegia* woodland, perennial herb up to 50 cm. high, young shoots flowering after burning of the grass, flowers yellow, standard streaked with purple, 1500 m., Sept. 13, 1946, *17625*.

This is probably related to *Crotalaria chrysochlora* Bak. f. ex Harms (Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 2: 244. 1911), but with straighter stems, longer peduncles, and larger flowers. More material is wanted, with pods.

Argyrolobium shirense Taub. in Engl. Pflanzenw. Ost-Afr. C: 207. 1895; Bak. f. Leg. Trop. Afr. 68. 1926.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, herb 1 m. high, flowers yellow, showy, fruit immature, 1500 m., June 5, 1946, *16267*. Cholo District: Cholo Mountain, frequent in rain-forest regrowths, subshrub 1 m. high, flowers yellow, 1200 m., Sept. 28, 1946, *17858*. Tanganyika Territory, Portuguese East Africa, Nyasaland, and S. Rhodesia.

Adenocarpus mannii (Hook f.) Hook f. Jour. Linn. Soc. Bot. 7: 189. 1864; Bak. f. Leg. Trop. Afr. 69. 1926.

Cytisus mannii Hook f. Jour. Linn. Soc. Bot. 6: 8. 1862.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in brushy forest-regrowths, shrub 3 m. high, flowers yellow, dry empty pods persistent from last season's flowering, 1900 m., June 28, 1946, *16510*. North Nyasa District: Nyika Plateau, occasional in second-growth forest, shrub 2 m. high, flowers yellow, 2440 m., Aug. 11, 1946, *17165*. Mountains of eastern Africa from the Anglo-Egyptian Sudan (Imatong Mountains) southwards to Nyasaland; also in the British Cameroons and on Fernando Po.

Parochetus communis Ham. ex D. Don, Prodr. Fl. Nep. 240. 1825.

Parochetus major Ham. ex D. Don, Prodr. Fl. Nep. 241. 1825; Bak. f. Leg. Trop. Afr. 70. 1926.

Zomba District: Zomba Plateau, creeping and matted in grass on edge of rain-forest, herb 15 cm. high, flowers blue, 1500 m., June 4, 1946, *Anthony 16223*. In the mountains of eastern Africa, with altitudinal range 1500–3350 m.; in the Belgian Congo, Abyssinia, Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, and Nyasaland; also extending through Asia, from India, Ceylon, Burma, Siam, and Java to China.

Lotus discolor E. Mey. Comm. Pl. Afr. Austr. 1: 92. 1836; Brand, Bot. Jahrb. 25: 213. 1898; Bak. f. Leg. Trop. Afr. 88. 1926.

Lotus tigrensis Bak. in Oliv. Fl. Trop. Afr. 2: 61. 1868; Brand, Bot. Jahrb. 25: 213. 1898; Bak. f. Leg. Trop. Afr. 88. 1926.
Lotus namulensis Brand, Bot. Jahrb. 25: 213. 1898; Bak. f. Leg. Trop. Afr. 87. 1926.
Lotus brandianus Harms, Bot. Jahrb. 28: 401. 1900; Bak. f. Leg. Trop. Afr. 87. 1926.
Crotalaria minor C. H. Wright, Kew Bull. 1901: 121. 1901.
Lotus minor (C. H. Wright) Bak. f. Leg. Trop. Afr. 89. 1926.

Zomba District: Zomba Plateau, grassy edges of rain-forest, herb 60–80 cm. high, of weak ascending habit, flowers pale yellow, standard red-purple streaked with purple, 1820 m., May 31, 1946, *16136*. Mlanje District: Mlanje Mountain, west slope, in open grassland, herb about 40 cm. high, branches spreading and ascending, flowers white, 1830 m., June 21, 1946, *16400*; Luchenya Plateau, frequent in grasslands, perennial herb prostrate and ascending, branches red, petals white streaked with red, 2100 m., July 3, 1946, *16647*; common in grasslands, perennial herb, prostrate or ascending, flowers white striped with red, 2100–2200 m., July 11, 1946, *16791*. British Cameroons (Bamenda, *Johnston J.205/31!* in Herb. Kew.), Belgian Congo, Abyssinia, Uganda, Kenya, Tanganyika Territory, Nyasaland, S. Rhodesia, and South Africa.

I feel that the only reasonable course is to sink several species under *Lotus discolor*. The "guttation" on the lower surface of the leaflets relied on by Brand to distinguish *L. discolor* and *L. namulensis* from *L. tigrensis* is due merely to a patchy development of pigment showing in the epidermis. While this is strongly developed in most South African specimens, in others it is absent or nearly so *(Hutchinson 4711, Macowan & Bolus 1261, Galpin 11471, 12050)*; and though absent from the type of *L. tigrensis*, is well shown on *Dr. Hugh. Scott* s.n. (Abyssinia, Mount Chillalo, Nov. 1926), which is obviously conspecific. In any event such a character is alone not a specific one in my opinion. Specimens from Mlanje Mountain—the type of *Lotus minor* is one—have very heavy pigmentation, while *Brass 16136* from Zomba represents the other extreme with little or no purple pigment and rather more pubescence. The length of the calyx-lobes varies considerably, but does not seem correlated with other characters.

Lotus sp. nr. oehleri Harms, Notizbl. Bot. Gart. Berl. 10: 79. 1927.

North Nyasa District: Nyika Plateau, common locally in open grasslands, perennial herb 30–50 cm. high, erect or suberect from a horizontal stock, flowers cream streaked with red, 2340 m., Aug. 14, 1946, *17217*.

This is the same as *McClounie 138* (Nyasaland) and *St. Clair Thompson 804* (southwestern Tanganyika Territory), both in Herb. Kew. These are very near *Lotus oehleri*, which is found in Tanganyika Territory and Kenya, and perhaps not specifically distinct, but pods are required for any certainty.

Indigofera ? trachyphylla[23] Benth. ex Oliv. Hook. Ic. Pl. *pl. 1354*. 1881; Bak. f. Leg. Trop. Afr. 103. 1926.

Kota-kota District: Nchisi Mountain, marshy ground in *Brachystegia* woodland, plant somewhat viscid, herb 50–70 cm. high, 1400 m., July 27, 1946, *16978*.

The only pods of *Indigofera trachyphylla* that I have seen are on *Buchanan 45*, and these are only up to 7 mm. long and 1.5 mm. in diameter. *Brass 16978* has pods up to 9 mm. long and 2–3 mm. in diameter; the greater thickness is particularly noticeable. The material is insufficient to tell whether *Brass 16978* is a distinct species, or whether the pods of *Buchanan 45* are immature.

I. trachyphylla has hitherto been known only from Nyasaland and N. Rhodesia.

Indigofera lyallii Bak. Jour. Linn. Soc. Bot. 20: 128. 1883; Bak. f. Leg. Trop. Afr. 161. 1926.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in secondary growths, tree or shrub up to 6 m. high and 15 cm. in diameter at breast-height, fruit only, 1900 m., July 7, 1946, *16705*. Nyasaland, S. Rhodesia, and Madagascar.

Indigofera fulvopilosa Brenan, sp. nov.

Indigofera pilosa Poir. var. *multiflora* Bak. f. Jour. Bot. 41: 243. 1903; Leg. Trop. Afr. 120. 1926.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb about 50 cm. high, soft brownish-pubescent, ascending, flowers brownish-red, 1100 m., June 18, 1946, *16360*. Sierra Leone *(Deighton 4870)*, Nigeria (Bauchi Plateau, *J. Dent Young 50, Lely P. 571, P. 687)*, Belgian Congo *(Ghesquière 4346)*, Uganda *(Dümmer 426, Hazel 258, 677, Chandler 1544, 1836)*, Tanganyika Territory *(Stolz 231, Rounce 6, Davies D. 278, D. 589, Geilinger 1806, Stenhouse 7, Emson 404)*, and Nyasaland (for specimens see Bak. f. l.c. 1903).

The characters given by Baker for his variety are so constant, correlated and well-marked that I am convinced that it should be considered as specifically distinct from *I. pilosa*. Mr. R. W. J. Keay, who has seen both plants living in Nigeria, tells me that he had considered them distinct.

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[23] I am most grateful to Dr. A. Cronquist for giving me his help and his opinions on my identifications in this and the following genera.

True *I. pilosa* Poir. (in Lam. Encyc. Suppl. 3: 151. 1813) was described as having subsolitary flowers and the calyces bristly with white hairs, and has clearly been correctly interpreted by Baker. *I. guineënsis* Schumach. & Thonn., given by Baker as a synonym, is described as being prostrate, with normally 3-flowered racemes, and thus cannot be *I. fulvopilosa*. True *I. pilosa* occurs in the Cameroons, Nigeria, Gold Coast (fide Schumacher & Thonning), Senegambia (fide Baker f.), French Sudan (fide Baker f.), Eritrea *(Pappi 355)*, and the Anglo-Egyptian Sudan *(Pfund 44, Broun 1353)*, with var. *angolensis* Bak. f., which is clearly related to *I. pilosa* rather than *I. fulvopilosa*, in Angola. I feel that the statement by Bak. f. (Leg. Trop. Afr. 120. 1926) that true *I. pilosa* occurs in Uganda and Tanganyika Territory requires confirmation.

The two species have different geographical ranges, although meeting in west Africa.

Indigofera viscosa Lam. Encyc. 3: 247. 1789; Bak. f. Leg. Trop. Afr. 123. 1926.

Zomba District: Zomba, frequent in grass in *Brachystegia* woodlands, herb 50 cm. high, subprostrate, flowers red, inflorescence and pods red-hairy, 1100 m., May 26, 1946, *16032*. North Nyasa District: Nyika Plateau, common on grassy edges of montane forest, herb 50–70 cm. high, red-hairy, flowers red, 2350 m., Aug. 17, 1946, *17280*. Widespread in tropical Africa and Asia.

This is a very variable plant, requiring further careful study.

Indigofera hilaris Eckl. & Zeyh. Enum. Pl. Afr. Austr. 241. 1836; Bak. f. Leg. Trop. Afr. 131. 1926.

Indigofera hockii De Wild. & Bak. Repert. Sp. Nov. 12: 297. 1913; Bak. f. Leg. Trop. Afr. 131. 1926.

Kota-kota District: Nchisi Mountain, in *Brachystegia* woodland, perennial herb 10–20 cm. high, flowers brownish-red, 1400 m., July 27, 1946, *16974*. Kota-kota, in old garden lands, herb, flowers purple, 460 m., Aug. 7, 1946, *Shortridge 17391**. Tanganyika Territory, Belgian Congo, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and South Africa.

I agree with Dr. A. Cronquist's opinion, expressed to me verbally, that *Indigofera hockii* is not specifically distinct from *I. hilaris*.

Indigofera atriceps Hook. f. Jour. Linn. Soc. Bot. 7: 190. 1864; Bak. f. Leg. Trop. Afr. 148. 1926.

Indigofera masukuënsis Bak. Kew Bull. 1897: 256. 1897; Bak. f. Leg. Trop. Afr. 148. 1926.

Zomba District: Zomba Plateau, common in moist grassy clearings, herb 1 m. high, upright, freely branched, 1400 m., May 28, 1946, *16067*. British Cameroons, Belgian Congo, Tanganyika Territory, Nyasaland, and Portuguese East Africa.

I consider the long patent flexuous hairs to vary both in quantity and distribution within this species. The type-gathering of *Indigofera masukuënsis* shows three pieces: on two of these the long hairs are absent from stem and pods; in the third they are absent from the stem but present on the pods. Other specimens, e.g. *Brass 16067*, have them present and abundant both on pods and stem.

I agree with Dr. A. Cronquist's opinion that *Indigofera atriceps* and *I. masukuënsis* are not separable. He considers that the plants with long setose hairs on the stem should be specifically separated from *I. atriceps* as *I. setosissima* Harms (Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 2: 252. 1911; Bak. f. Leg. Trop. Afr. 152. 1926). This may well be correct, but in view of the occurrence of intermediates on the Cameroon Mountain, and since there is no other morphological distinction, I prefer to treat *I. atriceps* in a wide sense.

Tephrosia purpurea (L.) Pers. Syn. Pl. 2: 329 (1807) var. **pubescens** Bak. in Oliv. Fl. Trop. Afr. 2: 125. 1871.

Chikwawa District: Lower Mwanza River, sandy beaches of river, herb 50 cm. high, greyish, flowers purple, 180 m., Oct. 4, 1946, *17972*. Widespread in the tropics.

Tephrosia interrupta Hochst. & Steud. ex Chiov. in Pirotta, Fl. Eritrea, Ann. Ist. Bot. Roma 8: 419, 420. 1908; Bak. f. Leg. Trop. Afr. 195. 1926.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, shrub 1–2 m. high, erect, sparsely branched, stem glaucous, leaves grey beneath, flowers dark purple, 1400 m., July 24, 1946, *16899*; one plant seen, in *Brachystegia* woodland, shrub 3 m. high, flowers white tinged with purple, 1350 m., Aug. 1, 1946, *17078*. Eritrea, Abyssinia, Kenya, Tanganyika Territory, and Nyasaland, for which this is the first record.

Tephrosia whyteana Bak. f. Trans. Linn. Soc. Bot. II. 4: 9. 1894; Leg. Trop. Afr. 212. 1926.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in rain-forest regrowths, shrub 2–3 m. high, large, loosely branched, flowers purple, showy, 1860 m., June 26, 1946, *16445*. Endemic to Mlanje Mountain.

Brass 16445 has the dark spreading hairs on the pedicels and calyces more numerous than in the type, but is otherwise a good fit, and I have no doubt whatever that it is conspecific.

Tephrosia aequilata Bak. in Oliv. Fl. Trop. Afr. 2: 113. 1871; Bak. f. Leg. Trop. Afr. 212. 1926.

Tephrosia nyasae Bak. f. Trans. Linn. Soc. Bot. II. 4: 9. 1894; Leg. Trop. Afr. 212. 1926.

Tephrosia zombensis Bak. Kew Bull. 1897: 257. 1897; Bak. f. Leg. Trop. Afr. 213. 1926.

Zomba District: Zomba Plateau, frequent among rocks on an exposed summit, shrub about 1 m. high, bushy, leaves silvery beneath, flowers dark purple, showy, fruit immature, 1500 m., June 2, 1946, *16154*. North Nyasa District: Nyika Plateau, occasional in grassland bordering forest, shrub 60–80 cm. high, flowers purple, 2350 m., Aug. 17, 1946, *17288*; Nchena-chena Spur, abundant in grasslands, shrub 1 m. high, freely branched and more or less flat-topped, flowers purple, 1900 m., Aug. 20, 1946, *17361*. Uganda, Kenya, Tanganyika Territory, Nyasaland, S. Rhodesia, and the Transvaal.

This is an exceedingly difficult complex. To my eye, the differences between the three above species are insufficient to keep them up, although the plants vary much in branching, indumentum, and size of leaves.

Tephrosia mildbraedii Harms in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 2: 255. *pl. 28.* 1911; Bak. f. Leg. Trop. Afr. 213. 1926.

Tephrosia nyikensis Bak. Kew Bull. 1897: 257. 1897; Bak. f. Leg. Trop. Afr. 212. 1926; omn. pro parte, vide infra.

North Nyasa District: Nyika Plateau; Nchena-chena Spur, in open grasslands, apparently rare, shrub about 1 m. high, branches few, erect, flowers purple, 1900 m., Aug. 20, 1946, *17352*. Belgian Congo, Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, and Nyasaland.

Dr. A. Cronquist points out to me that the type of *Tephrosia nyikensis* is a mixture of *T. mildbraedii* and *T. congestiflora* Harms, and that the latter name should be replaced by *T. nyikensis*.

Dr. Cronquist says also that *T. atroviolacea* Bak. f. [ex De Wild. Bull. Soc. Bot. Belge 57(2): 115. 1925] is not specifically separable.

Sesbania sesban (L.) Merr. Philipp. Jour. Sci. Bot. 7: 235. 1912.

Aeschynomene sesban L. Sp. Pl. 714. 1753.
Sesbania aegyptiaca ["Sesban aegyptiacus"] Poir. in Lam. Encyc. 7:128. 1806; Phillips & Hutch. Bothalia 1: 44. 1921; Bak. f. Leg. Trop. Afr. 259. 1929.

Kota-kota District: Benga, west shore of Lake Nyasa, plentiful on sandy lakeshores, shrub 2–3 m. high, flowers yellow mottled with purple, fruit pendent, 470 m., Sept. 2, 1946, *17482*. Chikwawa District: Lower Mwanza River, plentiful on sandy beaches, about 2 m. high, flowers yellow, fruit immature, 180 m., Oct. 6, 1946, *17995**. Old World tropics; also in central America and the West Indies, where it is probably introduced.

Herminiera elaphroxylon Guill. & Perr. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 201. *pl. 51.* 1832–1833.

Aeschynomene elaphroxylon (Guill. & Perr.) Taub. in Engl. & Prantl, Nat. Pflanzenf. 3^3: 320. *f. 124.* 1894; Bak. f. Leg. Trop. Afr. 289. 1929.

Kota-kota District: Benga, west shore of Lake Nyasa, plentiful in marginal sandy shallows of lake and on beach, tree or shrub 5–7 m. high, flowers orange-yellow, showy, pods viscid, hairy, 470 m., Sept. 2, 1946, *17494*. Native name, bingwi. Widespread in tropical Africa and Madagascar.

This is the ambatch of the Nile sudd.

Aeschynomene ? stolzii Harms, Bot. Jahrb. 54: 384. 1917; Bak. f. Leg. Trop. Afr. 290. 1929.

North Nyasa District: Nyika Plateau, common locally on forest edges, shrub 1–1.5 m. high, somewhat viscid, flowers orange-yellow, standard streaked with red, 2440 m., Aug. 11, 1946, *17170*.

No authentic specimens of *Aeschynomene stolzii* from Tanganyika Territory are available to me; *Brass 17170* apparently differs in not being prostrate or suffruticose. However I believe that Mr. Brass' specimen is conspecific with *Greenway 3568* from Rungwe, southwestern Tanganyika Territory, which is described as being a perennial mat-herb. If *Brass 17170* is *A. stolzii*, it is new to Nyasaland.

Aeschynomene megalophylla Harms, Repert. Sp. Nov. 8: 355. 1910; Bak. f. Leg. Trop. Afr. 291. 1929.

Mlanje District: Mlanje Mountain; Luchenya Plateau, abundant in forest regrowths, also found on rocky grass slopes near forest, tree or shrub up to 5–6 m. high and 25 cm. in diameter at breast-height, flowers as a shrub, but attains tree size, hairs viscid, petals golden-yellow, sepals red, 1900 m., July 7, 1946, *16717*. Nyasaland, and a form with glabrous leaves in S. Rhodesia.

Aeschynomene ? heurckeana Bak. Jour. Linn. Soc. Bot. 20: 130. 1883.

Aeschynomene dissitiflora Bak. Kew Bull. 1897: 259. 1897; Bak. f. Leg. Trop. Afr. 293. 1929.

North Nyasa District: Nyika Plateau, prostrate on open grassy bank of a stream, herb, flowers orange, 2200 m., Aug. 11, 1946, *17154*.

I do not consider that *Aeschynomene dissitiflora* can be specifically separated from *A. heurckeana*, a species hitherto known only from Madagascar. Certain specimens at Kew must certainly be referred to *A. heurckeana*, e.g. *Whyte* s.n. (Nyasaland, Masuku Plateau, 1980–2130 m., July 1896), *Hutchinson & Gillett 3730* (N. Rhodesia, Lukulu River, July 16, 1930) and *Schlieben 1193* (Tanganyika Territory, Upper Ruhudje, Lupembe area, N. of the river, frequent in riparian bush, 1600 m.).

Brass 17154 differs from *Aeschynomene heurckeana* solely in having a few hairs on the faces of the joints of the fruit; from *A. dissitiflora* it also differs in the smaller leaflets and shorter inflorescences.

Aeschynomene glauca R. E. Fr. Wiss. Ergebn. Schwed. Rhod.-Kongo-Exp. 12(1): 84. 1914; Bak. f. Leg. Trop. Afr. 297. 1929.

Dedza District: Dedza, sporadic in *Brachystegia* woodland, perennial herb 10–30 cm. high, young shoots flowering after burning of the grass, flowers yellow, streaked with purple, 1500 m., Sept. 13, 1946, *17628*. Southwestern Tanganyika Territory, Portuguese East Africa, Nyasaland, and N. Rhodesia.

I have not seen the type of this species, but there is good agreement with the original description. I associate with *Brass 17628* the following specimens in Herb. Kew.:

Tanganyika Territory (*Davies 682, Greenway 3643, Emson 395*, all from near Mbozi).

Portuguese East Africa (*Kirk* s.n. from Mungazi, 910–1070 m., Sept. 1859, *Archdeacon W. P. Johnson 454, Torre 244).*

Nyasaland (*Galpin* s.n. from Sulima Bay, L. Nyasa, Sept. 22, 1935).

Aeschynomene nyikensis Bak. Kew Bull. **1897**: 259. 1897; Bak. f. Leg. Trop. Afr. 297. 1929.

Dedza District: Dedza, common in *Brachystegia* woodlands, shrub about 2 m. high, viscid, erect, slender, flowers orange-yellow, 1500 m., July 23, 1946, *16883*. Kota-kota District: Nchisi Mountain, locally common in moist gullies in *Brachystegia* woodland, shrub 2–2.5 m. high, plant viscid, flowers yellow, 1400 m., July 25, 1946, *16936*. Southwestern Tanganyika Territory, Portuguese East Africa, Nyasaland, and (fide Bak. f. l.c.) Angola; a variety in S. Rhodesia (Suessenguth & Merxmueller, Trans. Rhod. Sci. Ass. **43**: 17. 1951).

Smithia elliotii Bak. f. Leg. Trop. Afr. 304. 1929.

Zomba District: Zomba Plateau, plentiful on grassy edges of rain-forest, perennial herb 60–80 cm. high, of ascending spreading habit, flowers purple, 1820 m., May 31, 1946, *16118*. Belgian Congo, Uganda, Tanganyika Territory, Nyasaland and Madagascar (*Perrier de la Bâthie 4211!* in Herb. Kew.). I know of no previous published record of *S. elliotii* from Nyasaland, though *Buchanan 159* and *665* (Herb. Kew.), both from Zomba and up till now wrongly named *S. sensitiva* Ait., are *S. elliotii;* these incidentally may be the basis of the Nyasaland record of *S. erubescens* (E. Mey.) Bak. f. (Leg. Trop. Afr. 304. 1929).

Smithia recurvifolia Taub. in Engl. Pflanzenw. Ost-Afr. C: 215. 1895; Bak. f. Leg. Trop. Afr. 307. 1929.

Smithia congesta Bak. Kew Bull. **1897**: 259. 1897; Bak. f. Leg. Trop. Afr. 308. 1929.
Smithia drepanophylla Bak. Kew Bull. **1897**: 260. 1897; Bak. f. Leg. Trop. Afr. 308. 1929.

North Nyasa District: Nyika Plateau, common on forest edges, shrub 1.5–2 m. tall, inflorescence viscid, flowers yellow, 2440 m., Aug. 11, 1946, *17171*; common on forest borders, shrub 1.5–2 m. high, bracts green, fringed with yellow hairs, flowers yellow, 2300 m., Aug. 13, 1946, *17198*. Tanganyika Territory and Nyasaland.

Smithia scaberrima Taub. in Engl. Pflanzenw. Ost-Afr. C: 215. 1895; Bak. f. Leg. Trop. Afr. 308. 1929.

Zomba District: Zomba Plateau, shrub 1.5–2 m. high, leaves shining grey-green above, racemes secund, flowers reflexed on the pedicels, yellow, fruit not seen, a showy shrub, 1430 m., May 29, 1946, *16075*. Mlanje District: Mlanje Mountain; Luchenya Plateau, very abundant in forest-regrowths, shrub 2-3 m. high, branched into a very dense flattish crown, flowers yellow, 2000 m., June 27, 1946, *16470*. Confined to Nyasaland.

Geissaspis drepanocephala Bak. Kew Bull. **1897**: 260. 1897; Bak. f. Leg. Trop. Afr. 313. 1929.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, perennial herb, 1400 m., July 26, 1946, *16951**; sporadic in *Brachystegia* woodlands, perennial herb, bracts green, 1400 m., Aug. 2, 1946, *17110**. Belgian Congo, Tanganyika Territory, Nyasaland, and N. Rhodesia.

Geissaspis ? descampsii De Wild. & Dur. Bull. Soc. Bot. Belge 39(2): 65. 1900; Bak. f. Leg. Trop. Afr. 317. 1929.

? District: North Road, between Mzimba and Kasungu, stony soil in *Brachystegia* woodlands, shrub 60 cm. high, 1400 m., Aug. 23, 1946, *17387*.

Two specimens in the Kew Herbarium—*St. Clair Thompson 1123, Pole Evans & Erens 638*—both certainly conspecific with *Brass 17387*, have been kindly compared with the holotype (Belgian Congo: Samba, Mar. 1891, *Descamps* s.n.) of *G. descampsii* by Dr. G. Troupin at Brussels. He writes that the two specimens sent "Diffèrent de *G. descampsii* De Wild. surtout par les folioles plus grandes, plus longuement et densement serrées aux bords; quant aux glandes (ou poils glandulaires), elles n'apparaissent pas sur les jeunes feuilles de l'holotype, mais bien sur un autre spécimen (*Vanden Brande 31*, Marungu) déterminé provisoirement. Vu le materiel peu abondant, il est quasi impossible de se rendre compte de l'éventuelle variation de cette espèce." He also very kindly sent some leaflets from the holotype of *G. descampsii*. In view of all this I feel that further gatherings of *G. descampsii* in the Belgian Congo may bridge the apparent difference in leaflet-size. I do not therefore feel prepared at present to separate *Brass 17387* from *G. descampsii*. I have seen plants conspecific with *Brass 17387* from Tanganyika Territory, Nyasaland, and N. Rhodesia.

Desmodium repandum (Vahl) DC. Prodr. 2: 334. 1825.

Hedysarum repandum Vahl, Symb. Bot. 2: 82. 1791.
Desmodium scalpe DC. Prodr. 2: 334. 1825; Bak. f. Leg. Trop. Afr. 328. 1929.

Zomba District: Zomba Plateau, frequent in weedy growths on rain-forest paths, herb about 80 cm. high, standard and wings red, keel greenish, tipped with red, 1450 m., June 3, 1946, *16176*. Mlanje District: Upper Ruo River, shrub, flowers red, about 850 m., July 4, 1946, *Vernay 16658*. Mlanje Mountain; Luchenya Plateau, occasional in moist openings in forest, shrub 50-70 cm. high, flowers orange-red, 1850 m., July 8, 1946, *16732*. Widespread in tropical Africa, also in the Transvaal, South Africa, and Madagascar.

I am greatly indebted to Dr. Bernice G. Schubert, who has most kindly confirmed my supposition that the name *Desmodium scalpe* must be replaced by *Desmodium repandum*. She writes: "I have on loan from Copenhagen what Schindler considered the type of *D. repandum* from Forskål's herbarium and shall send you a photograph later on. It is a miserably scrappy specimen but I don't think there is any doubt about the identity."

Desmodium salicifolium (Poir.) DC. Prodr. 2: 337. 1825; Bak. f. Leg. Trop. Afr. 330. 1929.

Hedysarum salicifolium Poir. in Lam. Encyc. 6: 422. 1804.

Kota-kota District: Chia area, in semi-shade on bank of a water-hole, flowers purple and white, 480 m., Sept. 1, 1946, *17462*. Widespread in tropical Africa and on Madagascar and the Mascarenes.

Desmodium dimorphum Welw. ex. Bak. in Oliv. Fl. Trop. Afr. 2: 161. 1871; Bak. f. Leg. Trop. Afr. 332. 1929.

Mlanje District: Likubula Gorge, rocky bed of river, shrub 80 cm. high, flowers pink, 840 m., June 20, 1946, *16367*. Widespread in tropical Africa.

Droogmansia whytei Schindl. Repert. Sp. Nov. 22: 271. 1926; Bak. f. Leg. Trop. Afr. 334. 1929.

Kota-kota District: Nchisi Mountain, common in *Brachystegia* woodland, shrub 2–2.5 m. high, erect and sparsely branched, flowers purple, standard streaked with red, 1400 m., July 24, 1946, *16890*. Tanganyika Territory, Nyasaland, and N. Rhodesia.

Vicia paucifolia Bak. in Oliv. Fl. Trop. Afr. 2: 173 (1871) var. **malosana** (Bak.) Brenan, var. nov.

Lathyrus malosanus Bak. Kew Bull. **1897**: 261. 1897.
Vicia malosana (Bak.) Bak. f. Leg. Trop. Afr. 347. 1929.

Zomba District: Zomba Plateau, climbing on grass edging rain-forest, vine, flowers blue, 1820 m., May 31, 1946, *16134*. For distribution see below.

Vicia paucifolia and *V. malosana* are separable, but by characters too poorly defined and inconstant to justify keeping them as species.

Vicia paucifolia Bak. var. **paucifolia.**

Vicia paucifolia Bak. l.c., sensu stricto.
Lathyrus schimperi Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:)265. 1892.
Vicia volkensii Taub. in Engl. Pflanzenw. Ost-Afr. C: 219. 1895.

Petiolus subnullus vel usque ad 2–5(–6) mm. longus. Foliola saepius 3–4, quorum par infimum saepe alternum. Cirri saepe furcati. Calycis dentes 3–5 mm. longi.

Vicia paucifolia Bak. var. **malosana** (Bak.) Brenan.

Folia sessilia vel subsessilia, petiolo usque ad 2 mm. longo. Foliola 2, raro 3–4, quorum par infimum oppositum. Cirri plerumque simplices. Calycis dentes 1.5–2(–3) mm. longi.

The difference in width of pod alleged by Bak. f. (Leg. Trop. Afr.) to separate *V. malosana* and *V. paucifolia* I am quite unable to confirm; I find no constant difference.

The var. *paucifolia* is found in Abyssinia, Kenya and the northern part of Tanganyika Territory. Its area does not overlap that of var. *malosana*, which is confined to the southwestern part of Tanganyika Territory *(Stolz 265, F. Zimmer 16, St. Clair-Thompson 692)* and Nyasaland *(Buchanan 399, Whyte* s.n., *Brass 16134).* The three Nyasaland gatherings have all been made on Mount Zomba. All the sheets cited are in the Kew Herbarium.

Abrus precatorius L. Syst. Nat. ed. 12: 472. 1767; Bak. f. Leg. Trop. Afr. 351. 1929.

Chikwawa District: Lower Mwanza River, in dry brushy forest, vine 3 m. high, 180 m., Oct. 4, 1946, *17959**. Native name (Chinyanja), ntimbua. Widespread in the tropics.

Brass 17959 consists of a leafless stem bearing fruits, which is *Abrus*, and a length of barren leafy stem, which is most probably *Lablab vulgaris* Savi. There are no specimens at Kew of *Abrus* from Nyasaland, but it is on record in Burtt Davy & Hoyle, Check-Lists For. Trees & Shrubs Brit. Emp. 2 (Nyasaland Protectorate): 58 (1936).

PUBLICATIONS OF

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Flora of Bermuda, by Nathaniel Lord Britton. 585 pages, 519 figures. 1918. $3.50.

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A TAXONOMIC REVISION OF THE GENUS MACROLOBIUM (LEGUMINOSAE-CAESALPINIOIDEAE)[1]

RICHARD S. COWAN

INTRODUCTION

Macrolobium is one of nearly a hundred genera of the subfamily Caesalpinioideae (Leguminosae), and with about twenty other genera comprises the tribe Amherstieae. The subfamily is exceptionally well developed in tropical America and many of its South American representatives are greatly in need of study. Such genera as *Swartzia* (tribe Tounateeae) and *Cassia* are quite confused taxonomically but are such immense groups that their study must be undertaken over a long period. The same sort of complexity has existed, to a lesser extent, in *Macrolobium,* which is sufficiently smaller so that a more immediate solution of its taxonomy appeared possible. In the course of routine identifications of the legumes from Venezuela, the writer became especially interested in this genus because of its morphological diversity and he became convinced that it was in need of critical investigation because of the difficulty encountered in naming these collections. Such a revision could profitably be undertaken at the New York Botanical Garden because of the considerable collections of the genus, including much type material, on deposit there.

What *Macrolobium* lacks in numbers of species is compensated for in numbers of individuals, for in some areas in Venezuela the author has observed riverine vegetation in which the commonest trees were members of this genus. It is found from northern Panama south to Peru on the western coast of South America and to southern Brazil on the Atlantic Coast. It is predominantly a genus of lowland riverine or savanna plants, but the species of section *Stenosolen* occur in the foothills on both sides of the Andes. The lands annually inundated by the overflow of rivers during the rainy season are a frequent habitat, but many species prefer the sandy savanna and sub-savanna areas. Certain taxa of the genus were observed by the writer growing only in the vicinity of rapids, but this must surely be an edaphic correlation.

Concurrently with the study of the materials of the genus in the herbarium of the New York Botanical Garden, loans were obtained from the major herbaria of the world which contain appreciable numbers of South American collections. These herbaria are listed below with the abbreviations used in the text, which are, for the most part, taken from the list by Lanjouw (1952).

A–Arnold Arboretum, Jamaica Plain, Massachusetts.
BM–British Museum (Natural History), London, England.
BGF–British Guiana Forest Department, Georgetown, British Guiana.
COL–Instituto de Ciencias Naturales, Bogotá, Colombia.
F–Chicago Natural History Museum, Chicago, Illinois.
G–Conservatoire et Jardin Botanique, Geneva, Switzerland.
GH–Gray Herbarium of Harvard University, Cambridge, Massachusetts.
IAN–Instituto Agronômico do Norte, Belém, Brazil.
K–Royal Botanic Gardens, Kew, England.
MO–Missouri Botanical Garden, St. Louis, Missouri.

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[1] Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, in the Faculty of Pure Science, Columbia University.

NY–New York Botanical Garden, New York, New York.
P–Muséum National d'Histoire Naturelle, Laboratoire de Phanerogamie, Paris, France.
RB–Secção de Botânica Sistemâtica, Jardim Botânico do Rio de Janeiro, Rio de Janeiro, Brazil.
U–Botanisch Museum en Herbarium van de Rijksuniversiteit te Utrecht, Utrecht, Netherlands.
UC–University of California Herbarium, Berkeley, California.
US–Smithsonian Institution, U. S. National Museum, Washington, D. C.
VEN–Division de Botánica, Ministério de Agricultura y Cria, Caracas, Venezuela.
W–Naturhistorisches Museum, Botanische Abteilung, Wien, Austria.
Y–Yale University School of Forestry, New Haven, Connecticut.

The author is much indebted to the directors and curators of all these institutions, from which specimens have been borrowed. He gratefully acknowledges the invaluable assistance of the following persons: Dr. Bassett Maguire, under whose direction this research was conducted and who contributed extensively with his encouragement and suggestions; Dr. David D. Keck and Dr. D. P. Rogers, who have contributed liberally of their time in the preparation of the manuscript and in the evaluation of the botanical conclusions during the absence of Dr. Maguire in South America; and Dr. H. W. Rickett, for kind assistance in editorial and bibliographic matters.

GENERIC RELATIONSHIPS

The tribe Amherstieae, while pantropic in distribution, is best represented in tropical South America and tropical West Africa. There are fewer genera of the tribe in South America than in Africa and they bear little resemblance to *Macrolobium*, whose closest relatives are certainly African. *Macrolobium*, as heretofore circumscribed, appears to be most closely allied to the African genus *Berlinia*, although the American species are strongly dissimilar, and the connection with this genus is through the African species of the *Macrolobium* complex. The relationship with other members of the Amherstieae is even more remote.

Although the geographical range of *Macrolobium* has always been considered to include tropical West Africa, recent developments have modified this view, at least for the writer. A letter from Dr. J. Léonard of Institut National pour l'Étude Agronomique du Congo Belge, Brussels, explained that he was completing a study of the African species of *Macrolobium* and he enclosed an impressive synopsis of his conclusions in the form of keys, tables, descriptions, and sketches. He explained that he was segregating two new genera from the African material and that he considered the remainder of the species under two subgenera of *Macrolobium* with the American species as a third subgenus. He asked consideration of his conclusions and especially that the characters be checked which he considered as significant in separating his various taxa, since he was less familiar with the American species. As I had not reviewed the African situation, I was pleased to have this opportunity of examining his work.

After careful examination of the differences involved, the following table of significant characters separating the species of America and Africa was submitted to Dr. Léonard, the points arranged in descending order of importance:

American Species	*African Species*
1. Petal one.	1. Petals (4–)5(–6).
2. Staminodia usually absent.	2. Small stamens and/or staminodia 4–7.

3. Foliar axis usually narrowly alate.	3. Foliar axis non-alate.
4. Claw of petal usually auriculate.	4. Claw not auriculate.
5. Fruit always smooth.	5. Fruit smooth or with transverse lines.

In a second letter, Dr. Léonard suggested that the number of petals, presence or absence of staminodia are the important characters which with the geographic distribution serve to separate these groups of species. He referred again, however, to the American species as possessing one large petal, sometimes accompanied by one to four small petals. The present writer considers the latter not as "small petals" but petalodia, that is, vestigial remnants of petals.

The point, morphologically, at which a petal becomes a petalodium is indeed obscure, but anatomical evidence has led the writer to the conviction that these bodies are more properly referred to as vestigial structures. Several of the American species were studied by means of transverse serial sections, and while the one large adaxial petal had a very obvious vascular supply in all the flowers of the few species studied, no sign of bundles for either vestigial petals or staminodia was observed. Whether or not the more prominent petals of the African species have a vascular system is not known, but in the American ones it appears that there is not more than one vascularized petal and furthermore the vestigial non-vascularized ones are deciduous at anthesis if formed at all and in any case are seldom observed.

Recently it was decided to attempt to secure additional data which might assist in the resolution of this problem of generic delimitation. Accordingly, Dr. G. Erdtman of the Palynological Laboratory at Bromma, Sweden, was asked to make available any information which he might have on this genus. He very kindly offered to undertake a study of the pollen morphology of the genus; for this immeasurable assistance I express my sincerest appreciation.

Material of thirteen African and nine American species was sent to Dr. Erdtman for his study. A preliminary report was received within a few weeks, with the statement that "the grains can be classified in two groups: South American species and African species." He pointed out that in both species-groups the sexine is conspicuously striate but that the striae in the American species are much more densely spaced than those of the African species. Further differences were found in the form of the striae and in the relative length of the baculae. These characters are apparently constant for each species-group, and, while microscopic, they lend valuable support to the arguments for maintaining the African and American species in separate genera.

In summary, Dr. Léonard contends that the occasional presence of "petals" and staminodia in the American species form a bond with the African species with their five petals and omnipresent small stamens and/or staminodia, for which reason they should be considered congeneric. The present writer maintains that the characters enumerated in the table above and the palynological characters are sufficient for the generic separation of these two groups. *Macrolobium* is here considered to be an American genus with its closest relatives the species in Africa formerly assigned to it; whether these latter species be referred to one genus or more than one is a problem for the students of the African floras to resolve.

HISTORY OF THE GENUS

Aublet in his publication on the plants of French Guiana (1775) described two new genera, *Vouapa* and *Outea*, the former with two species and the latter with one. *Vouapa bifolia* is recognizable from the description and plate, but the second species, *V. Simira,* is probably not congeneric. Although the type of *Outea guia-*

nensis has not been seen, there are two subsequent collections from Surinam which match Aublet's plate well and are accepted as representing this taxon.

Scopoli renamed *Vouapa* in 1777, calling it *Kruegeria*, and in 1789 Schreber included both *Vouapa* and *Outea* under a new name, *Macrolobium*, which gained general acceptance. In 1805 J. St.-Hilaire and in 1891 Taubert used Aublet's original generic names, but St.-Hilaire changed their spelling to *Vuapa* and *Utea*. The legitimate generic name was finally resolved by legislative action in the conservation of *Macrolobium* against *Outea, Vouapa*, and *Kruegeria* in 1935.

Between 1775 and 1870 very little was added to the knowledge of the genus aside from the descriptions of a few new species and the renaming of some of the older ones. Vogel (1837) described two new species, *M. pendulum* and *M. latifolium*, and at the same time created two sections. His first section included both *Vouapa* and *Outea* but he presented no name for it; the second section, which he called *Scytodium*, included only his new species, *M. latifolium*.

By 1870 some nine species had been proposed, and in that year Bentham published the first critical study of the genus in *Flora brasiliensis*, adding a number of new species based on Spruce's collections in Brazil. In this review he recognized only the name *Macrolobium*, relegating *Outea* and *Vouapa* to synonomy.

The following years witnessed the addition of numerous new species as northern South America became better known floristically. Both O. Kuntze and Taubert in 1891 placed most of the then known species in the genus *Vouapa* ("Vuapa" of Kuntze). Of more consequence was the treatment of the genus by Britton and Killip (1936). In this publication these authors maintained *Outea* as a genus distinct from *Vouapa*, the latter being considered as a synonym of *Macrolobium*. At the same time they established a new genus, *Pseudovouapa*, to include the single species *M. stenosiphon* Harms. The writer has found no morphological grounds for the recognition of *Pseudovouapa* and it is accordingly treated here as a synonym of *Macrolobium*. To be sure, there are abundant differences to distinguish its type species from all other species in the genus, but none is of generic magnitude.

Both Ducke and Pittier presented reviews of the genus (1941). Ducke's treatment included only the species of the "Amazonian Hylaea," and in it he presents keys to the species, general remarks concerning the plants, and the citation of Ducke collections. Pittier's review was somewhat more complete but included only the species of Venezuela. He included keys, brief descriptions, citation of a few specimens for each species, and the descriptions of three new species, one of which was conspecific with an earlier species.

Miss Amshoff (1948), working at Utrecht on Maguire's legume collections from Surinam, published the descriptions of two new species and one new variety; she also gives a key, but only to the species of Guiana.

MORPHOLOGY

Habit. Both shrubs and trees occur and each taxon is rather constantly of one or the other form. The minimum stature is realized in *M. savannarum*, which is characteristically a low shrub, often less than a meter in height when fully mature. At the other extreme, individuals to 35 m. tall were recorded by Krukoff for *M. campestre* var. *arboreum*. Many of the arborescent species have a spreading, more or less flat-topped crown.

Stipules. These structures occur in pairs at the base of the petioles but are most frequently caducous; in a few taxa *(M. huberianum* and *M. pendulum)* their persistence has been a useful character. In form, they vary from small subulate structures to large foliaceous ones; where possible their form and size have been used in the taxonomy of the genus, for both characters are quite stable.

Petiolules. Petiolules are infrequent and when present constitute a very usable characteristic; a few isolated examples occur in each of the sections. The term is herein applied to that portion, when present, of the leaflet below the last sensible trace of the blade.

Rachis Rudiment. In a few of the unijugate species, *M. pendulum* for example, the last vestige of the rachis persists as a subulate structure as much as a centimeter or more in length. It is generally caducous, but in the species named it is persistent or semi-persistent.

Leaflets. In form and dimensions there is the greatest diversity in these parts. In the more primitive species the form is mostly oblong and it is in the more highly evolved forms that other shapes occur. Both size and shape of the leaflets have been used systematically, but of greater importance is the number of pairs per leaf. They are always opposite and always in pairs except in some forms of *M. campestre* in which one of the leaflets of the terminal pair does not develop; the latter condition is referred to as pseudo-imparipinnate. The evolutionary tendency is toward a progressive reduction in the number of pairs with usually a corresponding increase in the leaflet size. However, this tendency has been expressed repeatedly and independently of all other characters.

The details of the venation are so uniform that they seldom furnish useful characters. However, characters of secondary importance are found in the degree of prominence of the costa (the "midrib" of the leaflet); in *M. limbatum* the primary vein branches (the first-degree branching of the costa) anastomose intramarginally to form a distinct submarginal vein, and such intramarginal nerves are also found in *M. retusum*. In *M. furcatum* and *M. flexuosum* the venules (the venation other than the costa and primary veins) are prominent, numerous, and closely parallel.

The vesture of the leaflets is quite variable and is used infrequently in the following treatment. The leaflets may be entirely glabrous or pubescent only on the costa or throughout. The under surface is commonly, but not always, covered by a persistent microscopic waxy bloom.

In a few taxa glandular punctae are present and are sufficiently constant to justify their use as a taxonomic character. These glands occur as small punctations of regular form and of uniform distribution over the lower leaflet surface.

Inflorescence. The inflorescence may be axial or terminal and ramiflorous or cauliflorous; the latter pair of characters is particularly useful taxonomically on the specific level. It is always racemose but considerably variable in dimensions and outline. In *M. furcatum* one or two short lateral racemes occur regularly toward the base of the inflorescence, but these are rare in other taxa.

The peduncle of the inflorescence is generally very short or absent but in *M. multijugum* and *M. molle* one as long as five centimeters is produced, which serves to distinguish these species.

Bracts occur regularly at the base of each pedicel, but these vary from minute, insignificant structures to those which surpass the flowers in length. They frequently furnish characters of some systematic importance in their size, form, and vesture. They are most frequently very early caducous but are persistent in several taxa; in *M. parvifolium*, for example, they persist as a wide band of imbricate sterile bracts at the base of the inflorescence.

The flowers are always borne on pedicels, at the apex of which are found two bracteoles which are connivent marginally to enclose the flower before anthesis. These bracteoles are variable in form not only between but also within taxa, but for taxonomic purposes they are much more reliable in their dimensions. At anthesis they open to the base along an adaxial and an abaxial line, releasing the infolded petal, stamens, and style. However, in section *Stenosolen* they open completely abaxially but only partially along the adaxial line (Fig. 1e). In the less highly evolved taxa the bracteoles are generally pubescent on both surfaces, but in more advanced groups they are pubescent on only one surface or entirely glabrous.

Flowers. The flower is composed of a hypanthium, four or five sepals, one petal, three stamens, and a single pistil (Fig. 1). The hypanthium, which is either sessile or stipitate, is here quite likely the result of the fusion of the bases of the filaments, the calyx, and possibly of the petal. It is either cupular or long-cylindric, and this difference is of first importance in distinguishing the two sections. It is cylindric and regular or nearly so in section *Stenosolen* but cupular and more or less zygomorphic in section *Vouapa* (Figs. 1a, e).

On the margin of the hypanthium are borne the sepals, petal, stamens, and sometimes the pistil as well. The calyx of section *Stenosolen* is regularly four-parted, with lobes about equal in size and about uniform in shape (Fig. 1e). In section *Vouapa* the lobes are five and free, or five with the adaxial pair united laterally to a greater or lesser extent, or four by the complete lateral union of the adaxial pair (Figs. 1a–d). While the number of sepals has been employed to some degree in delimiting species, it has more often been neglected for more easily discernible characters. In each of the phylogenetically lower taxa of section *Vouapa* the sepals are about equal in size, but in the more advanced forms the adaxial pair is often smaller and frequently of a different shape from the other lobes.

The single petal, which is situated on the adaxial side of the flower, is of two general types (Figs. 1a, e). In section *Stenosolen* it is an elliptic, oval, or oblanceolate organ, sometimes sessile or more often with a very short insignificant claw. In the section *Vouapa* the petal is provided with a definite stipe about as long as or longer than the transversely oval or orbicular blade. The term "transversely oval" refers to an oval outline in which the long axis is perpendicular to the claw. The size and form of the blade is of only moderate importance as a diagnostic character. Petalodia, that is, vestigial petals, occur sporadically in several groups, but they are so infrequent in their occurrence that they are rarely mentioned in the descriptions and are of no use taxonomically.

Of the three stamens, one is abaxial and the other two are lateral. Occasionally the length of the filaments and the presence or absence of pubescence on them provide the only characters of even secondary importance in delimiting taxa. They are always long and slender, bearing at their apex versatile, bilocular anthers. The pollen grains are trilobate, and Dr. Erdtman described their structure (in correspondence) as follows: "On micromorphological basis the 'sexine'...is conspicuously striate. The striae are densely spaced in the South American species; their upper surface is flat, and the extosexine (which forms the bulk of the striae) is supported by short rods ('bacula'); in some species they are almost lacking."

The single pistil consists of a short to long gynophore, an ovary, style, and stigma (Figs. 1a, e). Although the tribe Amherstieae has been characterized as possessing a gynophore inserted on the adaxial wall of the hypanthium, in *Macrolobium* it may be thus inserted or free from the hypanthium. Below the point at which the gynophore becomes free from the wall (except when it is basally in-

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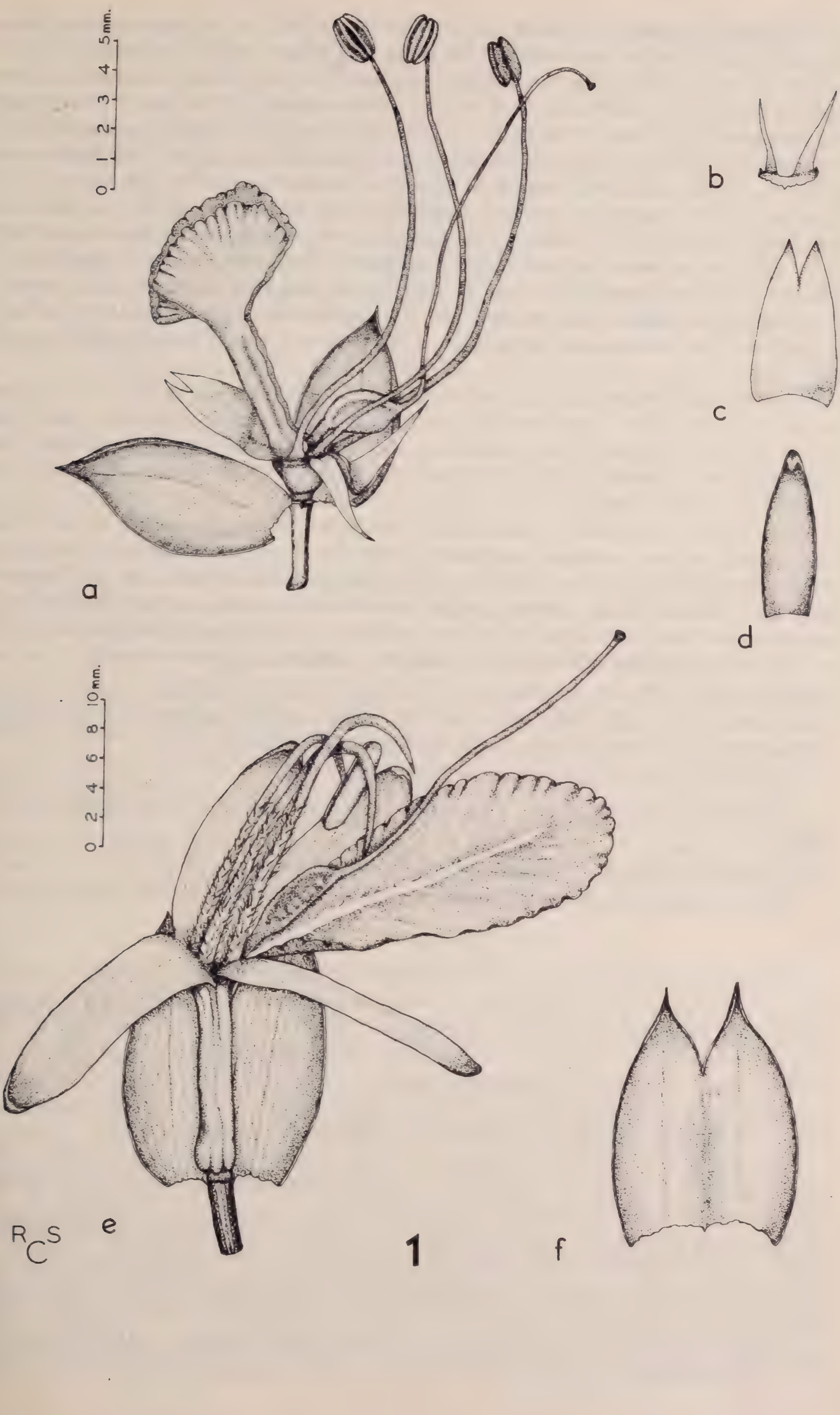
Explanation of Figure 1

FIG. 1. a. Flower of *M. multijugum*, a representative species of section *Vouapa*. b–d. Adaxial sepal pair from three species to show stages in lateral union; b. *M. microcalyx*, × 4; c. *M. multijugum*, × 4; and d. *M. canaliculatum*, × 2; e. Flower of *M. stenosiphon*, type species of section *Stenosolen*. f. Bracteoles of *M. stenosiphon* showing incomplete opening on adaxial side of flower.


0 1 2 3 4 5mm.
a
b
c
d
0 2 4 6 8 10mm.
e
f
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1

serted), its presence is indicated by a ridge to the base of the hypanthium. It appears probable that the ancestral forms had a basally attached gynophore.

The ovary provides important characters in the type and distribution of its pubescence, both of which are very stable characteristics. The ovary may be pubescent on all surfaces, marginally only, or completely glabrous. The ovules vary from one to eight, but it is usually in the more primitive groups that more than two or three appear. The other parts of the pistil contribute no usable characters.

Fruit. The legume is flattened laterally but is quite diverse in size and outline within the genus. It varies from suborbicular to oblong or cleaver-shaped and in length from about three centimeters to over fifteen centimeters. It may be indehiscent, as in *M. acaciaefolium, M. multijugum,* and *M. flexuosum* (fide Ducke), or dehiscent to release one to very few flat seeds which are orbicular to oblong in outline. The dimensions and shape of the legumes are of limited utility taxonomically.

Vesture. The pubescence found in the various species of the genus is always simple but sometimes considerably modified. The hairs of *M. latifolium* are distinctly clavate, and such hairs are also observed scattered amid the ribbon-like hairs of certain organs in *M. bifolium*. Uncinate hairs occur in a number of taxa, principally on the leaves.

The hairs are commonly less than a millimeter in length and in some forms visible only with a dissecting microscope, yet the character of the pubescence is used rather extensively, particularly its distribution and its presence or absence. Because differences in relative lengths are of true importance even in these minute hairs, it is necessary to define the author's use of terms in this paper which are more often applied elsewhere to hairs of considerably greater length.

1. Puberulous: hairs 0.1 mm. or less in length; this type of pubescence may be discernible with a hand-lens or naked eye (minutely puberulous) or a dissecting microscope may be necessary (microscopically puberulous).
2. Pilosulose: straight hairs about 0.3 mm. long.
3. Villosulose: similar to the preceding in length, but the hairs more or less tortuous.
4. Pilose: hairs straight and more than 0.3 mm. long.
5. Villose: hairs of about same length as preceding but more or less tortuous.

DEVELOPMENTAL TRENDS

Phylogenetic discussion on most groups of plants is often based on nearly pure speculation, with a minimum of concrete evidence. In *Macrolobium* the evidence is so fragmentary that the following is concerned only with possible trends of development which may have occurred in the evolutionary history of the genus. That is, these remarks are intended primarily to set forth the writer's conclusions regarding the possible sequence of the resultant morphological modifications, for these conclusions underlie the systematic organization presented later.

The species of the African genera related to *Macrolobium* reflect their relatively primitive nature in a number of respects, namely, by their pentamerous corolla and by their regular possession of small stamens and/or staminodia. In addition, they possess a cupular hypanthium, which form is considered to be antecedent to the cylindric form found in the species of section *Stenosolen* of the American genus *Macrolobium*. The species of section *Vouapa* of this genus have the same type of hypanthium as is exhibited by the more primitive African species.

It appears rather certain that there has been in *Macrolobium*, in several of the lines of relationship, a reduction in the number of sepals, from five to four. The anatomical results, cited earlier, indicate that this has been accomplished by the lateral union of the adaxial pair of sepals (Figs. 1b–d). Now, if the cylindric hypanthium is truly advanced, then we might expect that the calyx would also show the advanced sepal number of four. This is regularly true. In the two principal lines of development here designated as sections, the calyx has developed somewhat differently. There is a tendency in the species groups of section *Vouapa* for those species considered to be more advanced in the total of their characteristics to have the adaxial pair of sepals more or less reduced and often much different from the others in shape. In section *Stenosolen*, on the other hand, the sepals are about equal in size and essentially uniform in shape.

One of the basic differences separating the two sections of *Macrolobium* is the failure of the bracteoles to open completely on the adaxial side of the flower in section *Stenosolen* (Figs. 1e, f). What selective advantage such a modification could possibly possess is difficult to imagine, but it may be considered as a specialization, indicative of a derivation from the situation in the other section in which the bracteoles open completely.

The two sections are also easily separable by the presence or absence of a claw to the single petal. It appears possible that the clawed petal of section *Vouapa* is the more advanced form, having originated by elongation of the basal portion of the blade (Fig. 1a). On this basis, then, the section *Stenosolen*, more highly evolved in respect to floral characters, possesses the more primitive petal form. There is possible, however, an alternative hypothesis, that its subsessile or sessile petal may have evolved by the progressive abbreviation of the claw (Fig. 1e). If the latter could be demonstrated, the species of this section might be looked upon as the most advanced in all their floral characters.

In regard to developmental trends in the vegetative system, there is rather clearly a progressive reduction in the number of pairs of leaflets per leaf, which trend is more or less correlated with advancement in the flower. The more primitive species of both sections have multijugate leaves, but each of the lines within the sections is culminated by unijugate species.

The diagram of relationships (Fig. 2) is a graphic representation of the foregoing conclusions; the sole intent here is to indicate specific interrelationships. That is, a line in the diagram from one species to another does not necessarily imply that the writer believes the one species has given rise to the other.

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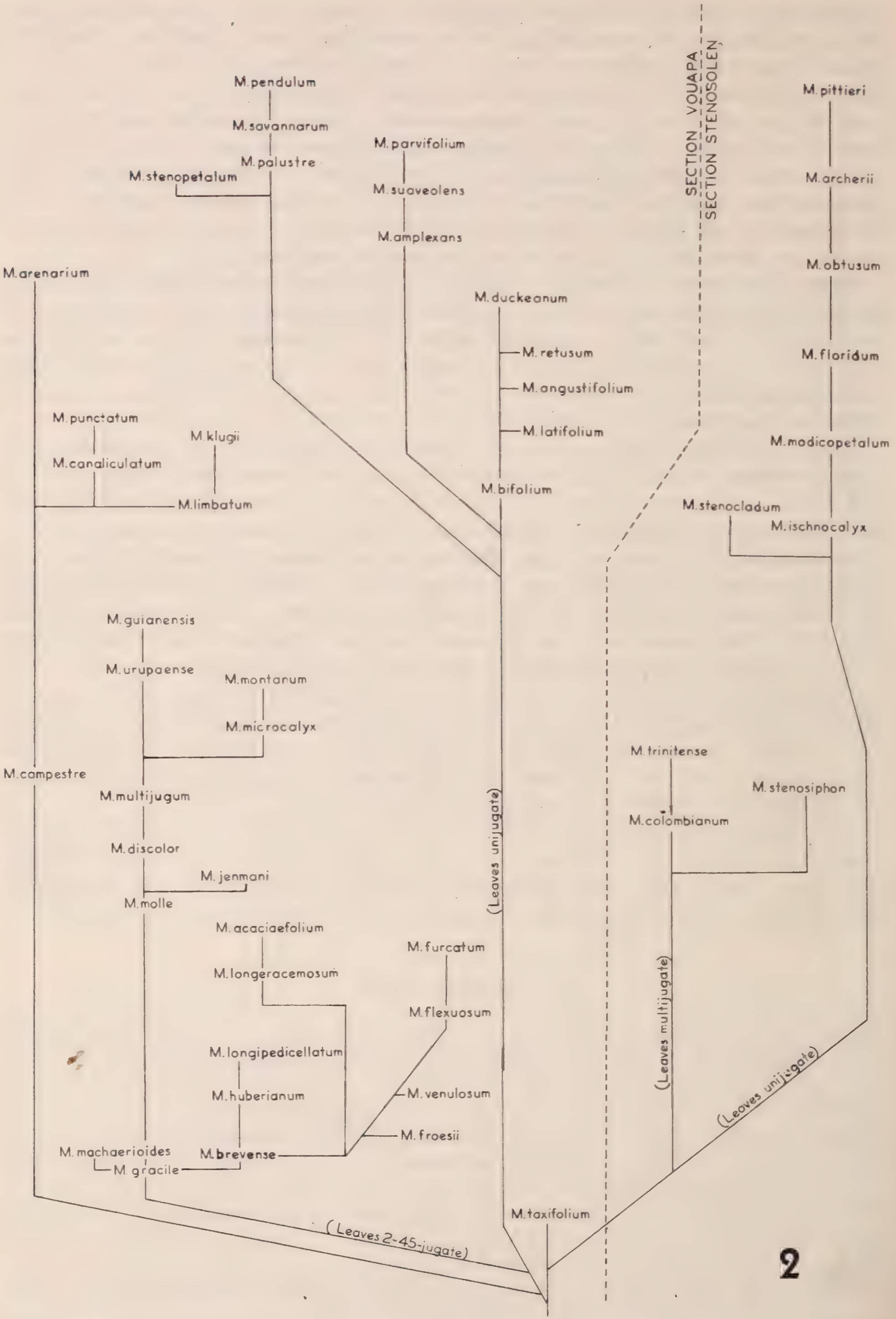

SECTION VOUAPA
SECTION STENOSOLEN
M. pendulum
M. savannarum
M. palustre
M. stenopetalum
M. parvifolium
M. suaveolens
M. amplexans
M. arenarium
M. duckeanum
M. retusum
M. angustifolium
M. latifolium
M. bifolium
M. punctatum
M. canaliculatum
M. klugii
M. limbatum
M. pittieri
M. archerii
M. obtusum
M. floridum
M. modicopetalum
M. stenocladum
M. ischnocalyx
M. guianensis
M. urupaense
M. montanum
M. microcalyx
M. campestre
M. multijugum
M. discolor
M. jenmani
M. molle
(Leaves unijugate)
M. trinitense
M. colombianum
M. stenosiphon
M. acaciaefolium
M. longeracemosum
M. furcatum
M. flexuosum
M. longipedicellatum
M. huberianum
M. venulosum
M. froesii
M. machaerioides
M. brevense
M. gracile
(Leaves multijugate)
(Leaves unijugate)
M. taxifolium
(Leaves 2-45-jugate)
2

FIG. 2. Diagram of putative relationships within the genus *Macrolobium*.

SYSTEMATIC TREATMENT

Macrolobium Schreb. Gen. Pl. 1:30. 1789. (Nomen conservandum.)
Vouapa Aublet, Hist. Pl. Gui. Franç. 1:25–28. 1775.
Outea Aublet, Hist. Pl. Gui. Franç. 1:28–30. 1775.
Kruegeria Scopoli, Introd. 314. 1777.
Vuapa J. St.-Hil. Expos. Fam. 2:203. 1805.
Utea J. St.-Hil. Expos. Fam. 2:203. 1805.
Pseudovouapa Britton & Killip, Ann. N. Y. Acad. 35:166. 1936.

Small shrubs to large trees. *Stipules* persistent or more frequently caducous, sometimes foliaceous. *Leaves* petiolate, 1–45-jugate, paripinnate or pseudo-imparipinnate. *Leaflets* opposite, inequilateral or infrequently equilateral, petiolules sometimes present; very diverse in size and form, sometimes punctate on the lower surface. *Inflorescence* racemose, rarely with short racemose branchlets, sessile or pedunculate; bracts usually caducous, diverse in size and form, often minute; bracteoles at the summit of the pedicels encasing the flower before anthesis, finally opening completely, or only partially on the adaxial side of the flower. *Hypanthium* sessile or stipitate, cupular to narrowly cylindric. *Sepals* four or five, sometimes the adaxial pair of different size and form from the others and free or united laterally to a greater or lesser extent. *Petal* one, stipitate or sessile, the blade orbicular, transversely or longitudinally oval, elliptic, or oblanceolate. *Stamens* three, the filaments filiform, the anthers versatile, dehiscing longitudinally, the pollen grains three-lobed. *Stigma* simple to capitate. *Style* long-filiform. *Ovary* 1–8-ovulate, the gynophore inserted at the base of or on the adaxial wall of the hypanthium. *Fruit* dehiscent or indehiscent, oval or orbicular to oblong, 1–few-seeded.

TYPE Species: *Macrolobium bifolium* (Aubl.) Pers. Syn. Pl. 1: 39. 1805.

Key to the Sections of *Macrolobium*

1. Hypanthium cupular (short-cylindric in *M. taxifolium*), about as long as or slightly longer than broad; bracteoles opening equally on both sides of the flower; sepals four or five, variable in shape and size; petal with a claw about as long as the blade. Sect. 1. *Vouapa*
1. Hypanthium cylindric, many times longer than broad; bracteoles usually opening completely on the abaxial side of the flower but only partially on the adaxial side; sepals always four, about equal in size and shape; petal sessile or with a claw much shorter than the blade. Sect. 2. *Stenosolen*

Macrolobium Section 1. **Vouapa** (Aubl.) Benth. in Mart. Fl. Bras. 15(2): 218. 1870.

Bracteoles opening completely on both sides of the flower; hypanthium cupular (short-cylindric in *M. taxifolium*); sepals four or five, usually unequal in shape and/or size; petal obviously clawed; gynophore inserted at any point from the base to the apex of the adaxial wall of the hypanthium.

TYPE Species: *Macrolobium bifolium* (Aubl.) Pers. (which is also the generic type).

Key to the Species of Section 1. *Vouapa*

1. Leaves 2–45-jugate. .... 2.
1. Leaves unijugate (some leaves bijugate in *M. palustre* and very rarely in *M. punctatum*). .... 31.
2. Leaflets with petiolules 2.5–6 mm. long, ovate to lanceolate, the base equilateral; bracts 5.5–12 mm. long, lanceolate and acuminate. .... 21. *M. campestre.*
2. Leaflets sessile, variously shaped, the base inequilateral; bracts smaller, variously shaped. .... 3.
3. Leaves 2–6-jugate. .... 4.
3. Leaves 6–42-jugate. .... 12.

4. Ovary glabrous on all surfaces. .... 5.
4. Ovary sparsely to densely pubescent on margins or on all surfaces. .... 7.
5. Peduncle (10–)15–25(–55) mm. long; leaflets strongly punctate on lower surface. .... 16. *M. multijugum.*
5. Peduncle 1.5–9 mm. long; leaflets epunctate. .... 6.
6. Leaves 5–7-jugate; bracteoles glabrous; filaments 25–35 mm. long, strongly villose. .... 19. *M. urupaense.*
6. Leaves 2–3-jugate; bracteoles pubescent on one or both surfaces; filaments 10–20 mm. long, villosulose basally or glabrous. .... 18. *M. montanum.*
7. Ovary villose on all surfaces; sepals free, strongly dimorphic, the adaxial pair smaller and of a different shape from the others. .... 17. *M. microcalyx.*
7. Ovary more or less pubescent on the margins only; sepals variable, sometimes dimorphic, free or united. .... 8.
8. Leaflets distinctly punctate on lower surface. .... 9.
8. Leaflets epunctate. .... 11.
9. Leaflets oblong to oblong-obovate; peduncles 9–55 mm. long; fruit 3–7.5 cm. long, 3–5 cm. wide. .... 10.
9. Leaflets lanceolate; peduncles 2–3 mm. long; fruit 12.5–15.5 cm. long, 7.5–9 cm. wide. .... 14. *M. jenmanii.*
10. Leaflets velvety-puberulous on the upper surface, pilose beneath; inflorescence pilosulose. .... 13. *M. molle.*
10. Leaflets glabrous or more often puberulous in a small area at base of costa; inflorescence glabrous or minutely puberulous. .... 16. *M. multijugum.*
11. Leaflets oval to elliptic, in two pairs, concolorous; inflorescence axis glabrous; stipules persistent. .... 20. *M. guianense.*
11. Leaflets oblong, oblong-oval or oblong-obovate, in 3–7 pairs, lower surfaces strongly glaucous. .... 15. *M. discolor.*
12. Leaves (4–)6–10-jugate. .... 13.
12. Leaves 10–42-jugate. .... 18.
13. Peduncle 10–55 mm. long. .... 14.
13. Peduncle 1–6 mm. long. .... 15.
14. Leaflets velvety-puberulous on the upper surface, pilose beneath, entire, involute narrowly; inflorescence pilosulose. .... 13. *M. molle.*
14. Leaflets glabrous or with few minute hairs beneath at base of costa, entire or sinuate, plane; inflorescence glabrous or minutely puberulous. .... 16. *M. multijugum*
15. Ovary glabrous; bracteoles glabrous or with a few apical hairs externally. .... 16.
15. Ovary pubescent throughout or only marginally; bracteoles pubescent on both surfaces or only on outer surface. .... 17.
16. Leaves 5–7-jugate, leaflets about twice as long as wide; filaments villose for half or more of their length, 25–35 mm. long. .... 19. *M. urupaense.*
16. Leaves 10–14-jugate, the leaflets about three times as long as wide; filaments glabrous, about 15 mm. long. .... 12. *M. furcatum.*
17. Inflorescence terminal; gynophore inserted at or near apex of dorsal wall of hypanthium; leaves never over 7-jugate, strongly glaucous beneath. .... 15. *M. discolor.*
17. Inflorescences axillary; gynophore inserted at base of hypanthium; leaves 10–16-jugate, not strongly glaucous beneath. .... 11. *M. flexuosum.*
18. Leaves 10–30-jugate (to 40-jugate in *M. gracile* var. *confertum* but this with densely pilosulose ovary marginally, much smaller bracts than in following species), leaflets plane or only very slightly convex; hypanthium cupular. .... 19.
18. Leaves 35–45-jugate, each leaflet strongly convex; hypanthium short-cylindric. .... 1. *M. taxifolium.*
19. Stipules persistent or caducous; pedicels averaging about 6 mm. long (4–8 mm.); bracteoles glabrous. .... 20.
19. Stipules caducous; pedicels shorter; bracteoles pubescent on both surfaces or only on outer surface (sparingly pubescent apically in *M. furcatum*). .... 21.
20. Stipules caducous; leaves elliptic or lanceolate, the leaflets truncate at apex, retuse to emarginate; bracts 8 mm. long, 2.5 mm. wide. .... 6. *M. longi-pedicellatum.*
20. Stipules persistent; leaves oblong to lance-oblong, the leaflets rotund apically, entire or subentire; bracts 3.5–5.5 mm. long, 1–1.5 mm. wide. .... 5. *M. huberianum.*
21. Bracteoles glabrous on inner surface, usually pubescent on outer surface; filaments glabrous; fruit about one and a half times as long as wide (three to four times in *M. longeracemosum*). .... 22.
21. Bracteoles pubescent on both surfaces (in *M. venulosum* only on inner surface near apex), pubescence on the two surfaces usually of different types; filaments villosulose

in lower part (glabrous in *M. froesii*); fruit two and one half to three and one half times as long as wide. .... 24.

22. Peduncles 4–6 mm. long; leaves 11–14-jugate, leaflets oval-oblong, the pairs 8–12 mm. apart; plant essentially glabrous. .... 12. *M. furcatum.*

22. Peduncles 0–4 mm. long, densely pilosulose, bracts pubescent on outer surface; ovary pilosulose marginally; branchlets densely pilosulose to glabrous; leaves commonly 15–25-jugate, the leaflets oblong, the pairs 4–8 mm. apart, usually pubescent on costa on lower surface but sometimes glabrous. .... 23.

23. Costa of leaflets distinctly salient on both surfaces, venules prominent on upper surface; bracteoles and pedicels lanulose-puberulous; fruit about three to four times as long as wide. .... 7. *M. longeracemosum.*

23. Costa impressed on upper surface of leaflets, salient beneath, venules obscure; bracteoles and pedicels pilosulose; fruit about one and a half times as long as wide. .... 8. *M. acaciaefolium.*

24. Leaves 10–16-jugate, pairs of leaflets 9–20 mm. apart, the leaflets with many closely parallel veins prominent on both sides, the median leaflets of mature leaves about 4 cm. long, 1.5 cm. wide. .... 11. *M. flexuosum.*

24. Leaves 10–40-jugate, pairs of leaflets 2–10 mm. apart, the leaflets with obscure veins or sometimes prominulous on one or both surfaces but then not closely parallel, median leaflets of mature leaves usually less than 2.5 cm. long, 1 cm. wide. .... 25.

25. Inflorescences 2–6.5 cm. long. .... 26.

25. Inflorescences usually less than 2 cm. in length. .... 2. *M. gracile.*

26. Inflorescence pilosulose, the bracteoles flexuose-pilosulose and pilose on outer surface; costa of leaflets strongly salient on upper surface. .... 4. *M. brevense.*

26. Inflorescence puberulous, the bracteoles puberulous or short-pilosulose and puberulous on outer surface; costa of leaflets plane or impressed on upper surface (salient in *M. gracile* variety *machadoense*, but this with strongly lanceolate leaves). .... 27.

27. Leaflets truncate at apex. .... 30.

27. Leaflets rotund at apex. .... 28.

28. Leaflets two to three times as long as wide, not tapering toward the emarginate or retuse apex. .... 29.

28. Leaflets four to six times as long as wide, tapering toward the entire or slightly retuse apex. .... 2. *M. gracile.*

29. Upper side of leaflet base strongly angular-auriculate, the apex strongly emarginate; sepals 1.5–2.5 mm. long, acute; filaments villosulose; ovary villose marginally .... 3. *M. machaerioides.*

29. Upper side of leaflet base not auriculate, the apex weakly retuse; sepals 3.5 mm. long, acuminate; filaments glabrous; ovary pilosulose marginally. .... 9. *M. froesii.*

30. Large shrub or small tree to 5 m. tall with branchlets, rachis, petioles and carpophores puberulous; leaves oblong, the leaflets in 13–17 pairs, 6–7 mm. apart, the costa plane on upper surface. .... 10. *M. venulosum.*

30. Tree 20 m. tall with branchlets, lower surface of rachis, and carpophores pilosulose; leaves strongly lanceolate, the leaflets in 20–24 pairs, 3–5 mm. apart, the costa salient on upper surface. .... 2. *M. gracile.*

31. Leaflets with well-developed intramarginal nerves. .... 32.

31. Leaflets without intramarginal nerves. .... 33.

32. Leaflets with venules closely parallel and prominulous on both surfaces, the intramarginal nerve originating from base of costa, the apex strongly emarginate, rotund. .... 30. *M. retusum.*

32. Leaflets with venules obscure or if prominulous, not closely parallel, the intramarginal nerve formed by anastomosing of primary veins, the apex entire, acute to acuminate. .... 25. *M. unijugum.*

33. Ovary pubescent throughout or only on margins. .... 34.

33. Ovary glabrous. .... 43.

34. Ovary pubescent throughout. .... 35.

34. Ovary pubescent only on margins. .... 41.

35. Hairs of inflorescence and flower parts preponderantly clavate; bracteoles 6–8.5 mm. long, very thick-coriaceous; hypanthium densely clavate-puberulous. Plants endemic to coastal rain forest of Brazil between Bahia and Ilheos. .... 28. *M. latifolium.*

35. Hairs not clavate but terete or ribbon-like; bracteoles smaller and thinner though sometimes coriaceous; hypanthium glabrous or with minute hairs sparsely distributed. Mostly northeastern South America. .... 36.

36. Leaflets epunctate on lower surface; blade of petal orbicular or oval. .... 37.

36. Leaflets punctate beneath; blade of petal oval transversely. .... 40.

37. Inflorescence densely puberulous, the hairs usually ribbon-like; costa of leaflets sulcate on upper surface, venules prominent, petioles glabrous; lateral surfaces of ovary and fruit papillate-puberulous. .... 27. *M. bifolium.*

37. Inflorescence minutely puberulous, the hairs terete; costa of leaflets not sulcate, the venules subobscure, petioles minutely puberulous; lateral surfaces of ovary and fruit not papillate-puberulous. .... 38.

38. Petioles 18–25 mm. long; leaflets 20–30 cm. long; sepals 6–6.5 mm. long. .... 25. *M. unijugum.*

38. Petioles 4–13 mm. long; leaflets 8–17 cm. long; sepals 1–4 mm. long. .... 39.

39. Costa of leaflet minutely puberulous on upper surface and strongly salient; petioles 4–6 mm. long; sepals 5, lanceolate, acute. .... 33. *M. suaveolens.*

39. Costa glabrous, plane; petioles 8–13 mm. long; sepals 4, oblong or oval, obtuse. .... 32. *M. amplexans.*

40. Leaflets broadly rotund-auriculate on lower side of base; petioles 10–16 mm. long; sepals 4.5–5 mm. long, oblong; petal blade 5.5 mm. long, 8 mm. wide. .... 31. *M. duckeanum.*

40. Leaflets cuneate at base; petioles 4–5 mm. long; sepals 1.5–3.5 mm. long, lanceolate; petal blade 3–4.5 mm. long, 3.5–4.5 mm. wide. .... 33. *M. suaveolens.*

41. Inflorescence densely puberulous to pilosulose, the bracts about 5 mm. long, 3 mm. wide, never triangular, the bracteoles strigulose within, densely puberulous to pilosulose externally; ovary pilosulose marginally, otherwise glabrous. .... 29. *M. angustifolium.*

41. Inflorescence glabrous or minutely puberulous, the bracts triangular, 1–1.5 mm. long and wide, the bracteoles glabrous, or minutely puberulous externally; ovary minutely puberulous marginally, otherwise glabrous. .... 42.

42. Inflorescence glabrous; petal about as long as bracteoles, more or less spatulate, without a definite claw; bracteoles oblong to lanceolate, 8–13.5 mm. long; hypanthium 3–4 mm. long. .... 38. *M. stenopetalum.*

42. Inflorescence minutely puberulous; petal longer than bracteoles, orbicular to transversely oval, with well-developed claw; bracteoles oval, elliptic or oblong, 5–6.5 mm. long; hypanthium 1–2 mm. long. .... 33. *M. suaveolens.*

43. Sepals five, free, or the adaxial pair more or less united. .... 44.

43. Sepals four, free. .... 46.

44. Leaflets equilateral, oval, lanceolate or ovate, not at all arcuate, the petiolules 3–5 mm. long, terete or plane on upper surface; inflorescence glabrous or pilosulose. .... 22. *M. arenarium.*

44. Leaflets inequilateral, oval-elliptic to elliptic, falcate or arcuate, epetiolulate; inflorescence axis minutely puberulous. .... 45.

45. Leaflets epunctate beneath, acute; bracts at base of inflorescence persistent, closely imbricate, sterile; ovary and gynophore glabrous. .... 34. *M. parvifolium.*

45. Leaflets punctate beneath, acuminate; bracts caducous; gynophore pilosulose on adaxial surface. .... 33. *M. suaveolens.*

46. Hypanthium 2.5–3.5 mm. long on stipe 2–4 mm. long; bracteoles apically rounded, apiculate or cuspidate, carnose, often early caducous; leaflets on petiolules 2–10 mm. long; petioles flattened dorso-ventrally. .... 47.

46. Hypanthium 1–2 mm. long, sessile or with stipe 1 mm. long; bracteoles acute to acuminate, persistent; leaflets sessile, petioles terete. .... 48.

47. Leaflets strongly rounded on lower side of base, often punctate beneath, falcate, apex acute to acuminate; sepals 4–7.5 mm. long; petal 4–5.5 mm. wide, more or less erect; bracteoles 3.5–8 mm. long, 2–3.5 mm. wide. .... 24. *M. punctatum.*

47. Leaflets not rounded basally, epunctate, moderately arcuate, apex rounded-obtuse; sepals 9.5–11 mm. long; petal 7–8 mm. wide, strongly recurved; bracteoles 10.5 mm. long, 5 mm. wide. .... 23. *M. canaliculatum.*

48. Stipules and rachis rudiment persistent; hypanthium strongly zygomorphic; leaflets often punctate. Belem and Amazon Delta region to southern Amazonas. .... 37. *M. pendulum.*

48. Stipules and rachis rudiment caducous; hypanthium symmetric to asymmetric; leaflets epunctate. Eastern Peru, upper Rio Negro and southwestern Venezuela. .... 49.

49. Filaments glabrous; petioles 1.5–4 mm. long; leaflets 1.5–5.5 cm. long, 1–2.5 cm. wide, lower side of base rounded. .... 36. *M. savannarum.*

49. Filaments pubescent toward base; petioles 7–18 mm. long; leaflets larger, base cuneate. .... 50.

50. Leaves always unijugate, the leaflets 11.5–17 cm. long, narrowly elliptic, the petioles 7–9 mm. long; inflorescence axis microscopically puberulous, the pedicels 4–5 mm.

long; sepals 5–5.5 mm. long; bracteoles 6.5 mm. long, 3 mm. wide, minutely puberulous externally; ovules 5. Eastern Peru. .... 26. *M. klugii.*

50. Leaves mostly unijugate but some bijugate, the leaflets 6.5–9.5 cm. long, subarcuate, elliptic, the petioles 13–18 mm. long; inflorescence axis glabrous, the pedicels 6–8 mm. long; sepals 7–8 mm. long; bracteoles 10–11 mm. long, 5 mm. wide, glabrous; ovules 1–2. Upper Rio Negro. .... 35. *M. palustre.*

Section 2. *Stenosolen* Harms, Repert. Nov. Sp. 3:51. 1906.

Bracteoles opening incompletely on the adaxial side of the flower, opening completely abaxially; hypanthium long-cylindric; sepals four, equal; petal sessile or with a very short claw; gynophore inserted at top of the adaxial wall of the hypanthium.

TYPE Species: *Macrolobium stenosiphon* Harms, Repert. Nov. Sp. 3: 51. 1906.

Key to the Species of Section 2. *Stenosolen*

1. Leaves 2–30-jugate. .... 2.
1. Leaves unijugate. .... 4.
2. Leaves 20–30-jugate, the leaflets subfalcate-lanceolate, mucronate-acuminate, with sericeous marginal band on upper surface; hypanthium 18–24 mm. long; sepals 18–22 mm. long; petal 30–45 mm. long. .... 39. *M. stenosiphon.*
2. Leaves 2–13-jugate, the leaflets oblong, lanceolate-oblong, or elliptic, obtuse or bluntly acuminate, glabrous or ciliolate on margin; hypanthium, sepals and petal much shorter. .... 3.
3. Leaflets elliptic, in 2–4 pairs; inflorescences cauliflorous, glabrous; ovary glabrous. Northern Trinidad. .... 41. *M. trinitense.*
3. Leaflets oblong or lanceolate-oblong, in 5–13 pairs; inflorescences terminal or axillary, pubescent or the pedicels glabrous; ovary pubescent throughout or only marginally. Foothills of Andes in Colombia and Venezuela. .... 40. *M. colombianum.*
4. Leaflet strongly asymmetrical at base, the lower side rounded to subcordate, the upper side tapering. .... 5.
4. Leaflet cuneate at base or nearly so. .... 8.
5. Sepals 10–13 mm. long; hypanthium minutely puberulous. State of Aragua, Venezuela. . ... 6.
5. Sepals 17–22 mm. long; hypanthium glabrous. Southern Panama or Colombia. ....7.
6. Petal blade 30 mm. long; leaflets oblanceolate-elliptic, bluntly acute; hypanthium 9–12 mm long; bracts 2–3 mm. long. ....45. *M. floridum.*
6. Petal blade 20 mm. long; leaflets elliptic-oval or broadly oblanceolate, broadly rounded; hypanthium 6.5–9.5 mm. long; bracts 1–1.5 mm. long. .... 46. *M. obtusum.*
7. Petal 28 mm. long, 12 mm. wide, sessile, glabrous; hypanthium 14 mm. long on a 4.5 mm. stipe; bracteoles 17 mm. long, 6.5 mm. wide, minutely puberulous on outer surface; leaflets elliptic, bluntly acuminate. .... 47. *M. archeri.*
7. Petal 47 mm. long, 15 mm. wide, the claw 5 mm. long, strigulose within on costa in the lower portion of petal; hypanthium 10 mm. long on a 3 mm. stipe; bracteoles 12 mm. long, 4 mm. wide, glabrous; leaflets oblanceolate, caudate-acuminate. .... 48. *M. pittieri.*
8. Leaflets 4–10 cm. long, sessile, epunctate; sepals oblanceolate; ovary densely puberulous throughout. .... 42. *M. stenocladum.*
8. Leaflets 13.5–33 cm. long, usually petiolulate, punctate beneath, sometimes minutely so; sepals oblong; ovary puberulous marginally with lateral surfaces glabrous or minutely granular-puberulous. .... 9.
9. Pedicels 2.5–5 mm. long; bracteoles 9–13 mm. long; hypanthium 6–11 mm. long on a stipe 2.5–5.5 mm. long, minutely puberulous; sepals 10.5–15 mm. long, 3–5.5 mm. wide; petal unguiculate, 24–34 mm. long; ovary minutely granular-puberulous on lateral surfaces. Western Peru and Colombia. .... 43. *M. ischnocalyx.*
9. Pedicels 0.5–1 mm. long; bracteoles 5.5–7.5 mm. long; hypanthium 3–4 mm. long on a 1 mm. stipe, glabrous; sepals 5.5–8.5 mm. long, 1–3.5 mm. wide; petal sessile, 11.5–13.5 mm. long; ovary glabrous on lateral surfaces. Northwestern Panama and western Colombia. .... 44. *M. modicopetalum.*

1. Macrolobium taxifolium Spruce ex Benth. in Mart. Fl. Bras. 15(2): 224. 1870.

Vouapa taxifolia (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 394. 1891.

Vuapa taxifolia (Spruce ex Benth.) Kuntze, Rev. Gen. 1: 213. 1891.

Tree 5–7 m. tall, the branchlets pilosulose. *Stipules* 15 mm. long, 2.5 mm. wide, subfalcate-linear, ciliolate. *Petioles* 6 mm. long, canaliculate, pilosulose. *Leaf blades* oblong-lanceolate, 36–42-jugate, the pairs of leaflets about 3 mm. apart; rachis 8.5–13 cm. long, pilosulose except on the lower surface of the narrow wings. *Leaflets* 5–20 mm. long, 1–3 mm. wide, linear, the base inequilateral, obtuse, the apex rotund, minutely apiculate, the upper surface convex, glabrous, nitid, the lower surface glabrous or the costa with very few hairs, the costa plane on the upper surface, salient beneath, the venules obscure. *Inflorescence* 6.5–8 cm. long, the axis pilosulose, the peduncle 3–4 mm. long; bracts 5.5 mm. long, 4.5 mm. wide, broadly oval, pilosulose, more strongly so externally; pedicels 2.5–3 mm. long, pilosulose; bracteoles 7 mm. long, 4 mm. wide, obovate or oval, bluntly acute, pilosulose externally and in the basal half within. *Hypanthium* 3–3.5 mm. long, glabrous, the stipe 0.5–1 mm. long, puberulous. *Sepals* four, equal, 5.5 mm. long, 1.5–2.5 mm. wide, oblong, fleshy-coriaceous, sparsely ciliolate near the apex. *Petal* blade about 6 mm. long, 4 mm. wide, orbicular, decurrent on the 4 mm. long claw, glabrous. *Filaments* 21.5 mm. long, glabrous. *Stigma* simple. *Style* 20 mm. long, glabrous. *Ovary* 3.5 mm. long, 1.5 mm. wide, oblong, glabrous or with very few hairs on abaxial margin, 3-ovulate; gynophore 2.5 mm. long, pilosulose sparingly, inserted at top of the adaxial wall of the hypanthium. *Fruit* unknown.

Type Collection: R. *Spruce 3566,* "In Guainia ripis," supra ostium flum. Casiquiari, Venezuela, May-June 1854 (HOLOTYPE K, isotypes G, GH, NY, P, US-frag., W). Known only from the type collection.

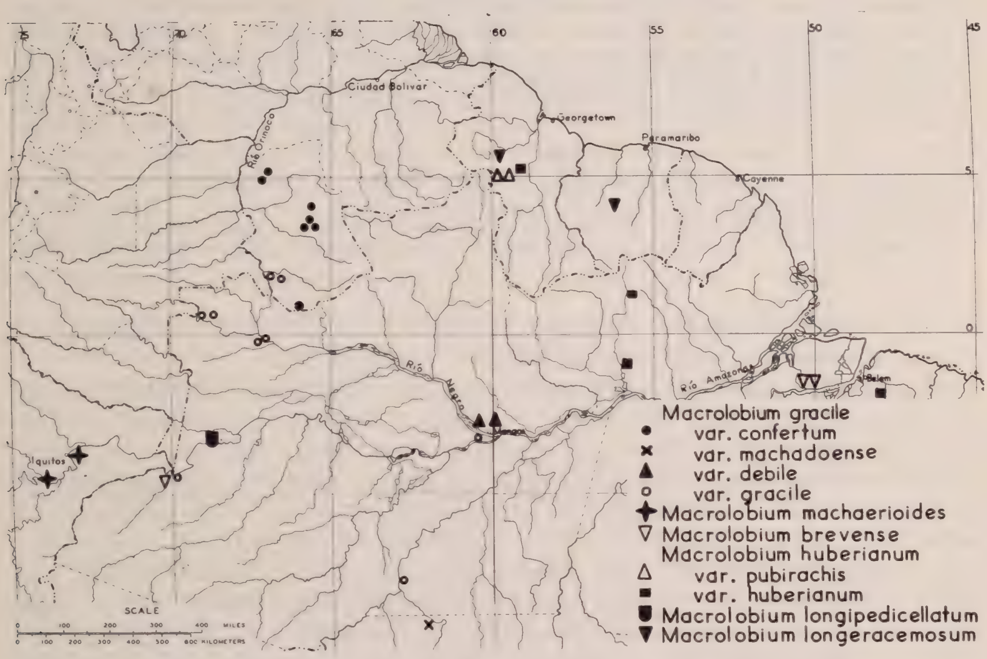
Macrolobium taxifolium is placed at the beginning of this treatment because it appears to be the nearest living relative to the ancestral stock, which, hypothetically, gave rise to the two principal divergent lines within the genus. Actually, it lies about midway between the two sections, but in its more important characters appears to be more closely associated with the species of section *Vouapa.*

If the characters of *M. taxifolium* are compared with those separating the two sections, the following will be apparent. It has a short-cylindric hypanthium which is about twice as long as wide and is thus similar to that attained in the more primitive groups of section *Stenosolen.* The bracteoles open completely on both the adaxial and abaxial sides of the flower, thereby exhibiting a character of the first section. The sepal number by itself is a character of secondary importance, but here there are four equal sepals inserted on a short-cylindric hypanthium, in this respect resembling more closely the second section than the first. The petal possesses a long claw as in section *Vouapa* but it is not well-delimited from the blade.

This species is not at all closely related to any other known species; it may be most easily distinguished by its 35–45-jugate leaves, the leaflets of which are strongly convex on the upper surface, in addition to the diagnostic characters discussed above.

2. **Macrolobium gracile** Spruce ex Benth. in Mart. Fl. Bras. 15(2): 223. 1870. **Figure 3.**

Shrub or slender tree 4–20 m. tall, the branchlets pilosulose or pilose. *Stipules* 2–14 mm. long, 0.5–1 mm. wide, usually caducous, subulate-linear, linear, or linear-lanceolate, pilosulose on the outer surface, glabrous within. *Petioles* 1.5–6 mm. long, canaliculate, pilosulose. *Leaf blades* lanceolate, elliptic-oblong, or lanceolate-oblong, 10–40-jugate, the pairs of leaflets 2–8 mm. apart; rachis 4–14 cm. long, pilosulose or uncinate-puberulous on the upper surface and pilosulose or glabrous beneath. *Leaflets* 2–28 mm. long, 1–8 mm. wide, oblong or linear, the base inequilateral, the upper side obtuse to cordate, the lower side acute or obtuse, the apex rotund or rotund-truncate, retuse to emarginate or less frequently entire, minutely mucronate or apiculate; upper surface pilosulose, or puberulous, or pubescent only at the base with the costa pilosulose or puberulous or very rarely completely glabrous, the lower surface glabrous, generally pilose or pilosulose, the apical-lateral surface of the costa more densely invested, or more or less pubescent only on the apical one-half of the blade and the costa; costa plane to impressed, or salient on the upper surface, salient beneath, the venules obscure. *Inflorescences* 1–6.5 cm. long, the axis puberulous, the peduncle (when present) 1–3 mm. long; bracts 1.5–3 mm. long, 1–2.5 mm. wide, triangular, triangular-lanceolate, triangular-ovate, or oblong-ovate, glabrous within, puberulous externally; pedicels 1–3 mm. long, puberulous; bracteoles 5–7.5 mm. long, 2–4 mm. wide, oblanceolate, elliptic, lanceolate, or oblong, acute to acuminate, pilosulose or puberulous externally, pilose, pilosulose, or villosulose within, sometimes sparingly so. *Hypanthium* 1–1.5 mm. long, subsessile, sparingly puberulous, pilosulose, or infrequently glabrous. *Sepals* five, free or infrequently the adaxial pair partly united, 1–4.5 mm. long, 0.5–2 mm. wide, the adaxial pair often triangular, the others lanceolate or triangular-lanceolate, acute to acuminate, sparingly to sparsely ciliolate, infrequently glabrous. *Petal* blade 2.5–7.5 mm. long, 3–8.5 mm. wide, commonly transversely oval, sparingly villosulose on one or both surfaces in the center or only in the throat, the claw 3–6 mm. long, villosulose on both surfaces or only at the base externally, ciliolate. *Filaments* 13–27.5 mm. long, villosulose in the lower part. *Stigma* capitellate. *Style* 16.5–22 mm. long, villosulose or pilose basally. *Ovary* 1.5–2.5 mm. long, 0.5–1 mm. wide, fusiform or oblong, villose or pilose marginally, the lateral surfaces glabrous, 2-ovulate; gynophore 2–3 mm. long, villose or pilose, inserted in the hypanthium at the base,


75
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Ciudad Bolivar
Georgetown
Paramaribo
Cayenne
Rio Orinoco
Rio Negro
Rio Amazonas
Iquitos
Belem
Macrolobium gracile
● var. confertum
× var. machadoense
▲ var. debile
○ var. gracile
✚ Macrolobium machaerioides
▽ Macrolobium brevense
Macrolobium huberianum
△ var. pubirachis
■ var. huberianum
▮ Macrolobium longipedicellatum
▼ Macrolobium longeracemosum
SCALE
0 100 200 300 400 MILES
0 100 200 300 400 500 600 KILOMETERS

FIG. 3. Geographic distribution of several species of *Macrolobium*.

midway or at the margin of the adaxial wall. *Fruit* (immature to mature) 5.5–11.5 cm. long, 2.5–5 cm. wide, oblong, oblong-oblanceolate, or oblong-obovate, sparingly to sparsely pilose or glabrous on the margins, the carpophores 4–16 mm. long, sparingly pilose or pilosulose. *Seeds* 3.5 cm. long, 2.5 cm. wide, oval, the testa membranous, venose.

Key to the Varieties of *Macrolobium gracile*

1. Inflorescences less than 2 cm. long. .... 3.
1. Inflorescences 2.5–6.5 cm. long. .... 2.
2. Apex of leaflets rotund, entire to retuse, usually much narrower than the base, the median leaflets of mature leaves four to six times as long as wide, the costa plane to impressed on upper surface; leaves oblong to oblong-lanceolate; mature fruit 5.5–8 cm. long, 2.5–3 cm. wide. .... 2a. var. *confertum.*
2. Apex of leaflets truncate, strongly emarginate, not appreciably narrower than base, the median leaflets of mature leaves about two to three times as long as wide, the costa salient on upper surface; leaves lanceolate; immature fruit 11–11.5 cm. long, 3.5 cm. wide. .... 2b. var. *machadoense.*
3. Leaves 20–30-jugate; median leaflets of mature leaves four or more times as long as wide, glabrous, or sparsely pubescent on costa and base of blade, the apices distinctly mucronate. .... 2c. var. *debile.*
3. Leaves (10–)15(–20)-jugate; median leaflets of mature leaves usually about three times as long as wide, the upper surface usually pilosulose, the lower pilose, the apices minutely apiculate. .... 2d. var. *gracile.*

2a. Macrolobium gracile var. confertum (Gleason) Cowan, comb. nov. **Figure 3.**

Macrolobium confertum Gleason, Bull. Torrey Club 58: 371. 1931.

Low tree with spreading, flat-topped crown, 5–7 m. tall, the branchlets densely pilosulose. *Stipules* 6–14 mm. long, 1 mm. wide, caducous or persisting one season, acuminate. *Petioles* (2–)3(–6) mm. long. *Leaf blades* oblong to oblong-lanceolate, (14–)18–30(–40)-jugate, the pairs of leaflets (3–)4(–6) mm. apart; rachis (5–)8–10(–13.5) cm. long, pilosulose but sparingly so on the lower surface of the narrow erect wings, densely so above. *Leaflets* (4–)6–15(–28) mm. long, (1–)2–4(–6) mm. wide, linear, the base obtuse, the apex rotund to rotund-truncate, narrowing toward the entire to retuse apex, minutely apiculate, glabrous or more often sparsely to strongly puberulous on the costa on the upper surface, the hairs often uncinate, beneath glabrous, or sparingly pilosulose on the costa, the hairs often subappressed or appressed, the costa plane to impressed on the upper surface. *Inflorescence* (2.5–)3–5(–6.5) cm. long; bracts 2.5–3 mm. long, 1–2.5 mm. wide; pedicels (1–)2(–3) mm. long; bracteoles (5.5–)6–7 mm. long, 2.5–4 mm. wide, oblong to lanceolate, acute to acuminate, puberulous externally, villosulose within, at least in the upper half. *Sepals* 1.5–4.5 mm. long, 0.5–2 mm. wide, lanceolate, acute to caudate-acuminate. *Petal* blade (3.5–)4(–7.5) mm. long, (3.5–)5(–8.5) mm. wide, the claw (4–)5(–6) mm. long, the petal villosulose over the entire outer surface or only at the base, villosulose within, sometimes sparsely so. *Filaments* (16–)20(–27.5) mm. long. *Style* 15.5–22 mm. long, villosulose basally. *Ovary* oblong, villose marginally; gynophore villosulose, inserted near the apex of the adaxial wall of the hypanthium. *Fruit* 5.5–8 cm. long, 2.5–3 cm. wide, oblong to oblong-obovate or oblong-oblanceolate, glabrous or with few scattered hairs on the margins, the carpophores 4–6 mm. long, pilosulose. *Seeds* about 1.5 cm. long, 1 cm. wide, oval, the testa membranous, venose.

Type Collection: *G. H. H. Tate 375*, "slopes of Mt. Duida, 750'," Amazonas, Venezuela, Nov. 1928 (HOLOTYPE NY).

Additional Specimens: VENEZUELA: Caño Asisa near Serraniá Paru, Feb. 1951, *Cowan & Wurdack 31523* (K, NY, US, VEN), *31526* (F, G, K, MO, NY, US, VEN); western foothills Serra Imeri, near Salto de Huá, Nov.–Dec. 1930, *Holt & Blake 482* (A, NY, US, VEN); banks of Rió Cunucunuma above Playa Alta, Nov. 1950, *Maguire, Cowan & Wurdack 29496* (F, NY), *29505* (NY, US, VEN); Culebra, Rió Cunucunuma, Dec. 1950, *Maguire, Cowan & Wurdack 30357* (K, NY, US), *30362* (B, BM, F, G, GH, IAN, K, LE, MO, NY, P, RB, S, U, UC, US, VEN); Rió Cuão, Nov. 1948, *Maguire & Politi 27383* (FHO, NY, TH, WTU), *27447* (F, G, GH, IAN, K, MO, NY, P, RB, U, US, VEN); Rió Cuão, Jan. 1949, *Maguire & Politi 28526* (A, BPI, MICH, NY); forest along Caño Negro, southeastern base of Cerro Duida, alt. 225 m., Aug. 1944, *Steyermark 57940* (F, MO, VEN).

2b. Macrolobium gracile var. machadoense Cowan, var. nov. **Figure 3.**

Arbor 20 m. alta, 6 cm. diametro, ramulis dense pilosulis. Stipulae 4.5–5.5 mm. longae, 0.5 mm. latae. Petiolus 2–3 mm. longus, canaliculatus, pilosulus. Foliorum lamina lanceolata, 20–25-jugata; rachibus 5.5–9 cm. longis, supra uncinato-puberulis, infra sparse pilosulis ad glabris. Foliola 2–15 mm. longa, 1–5 mm. lata, oblonga, ad basim inaequilateralia, ad apicem truncata, emarginata, minute apiculata, supra in costa puberula, infra plus minusve pilosula, costa ambobus lateribus salienti, venulis obscuris. Inflorescentiae 4.5–5 cm. longae, axe puberulo, flos ignotus. Fructus immaturus 11–11.5 cm. longus, oblongus, apicem versus latior, carpophoro 5 mm. longo, pilosulo.

Type Collection: *B. A. Krukoff 1350*, "upper Machado River, near Tabajara," Matto Grosso, Brazil, Nov.–Dec. 1931 (HOLOTYPE NY, isotypes A, F, G, MO, P, U, UC). Known only from the type collection.

2c. Macrolobium gracile var. debile (Ducke) Cowan, comb. nov. **Figure 3.**

Macrolobium debile Ducke, Bull. Mus. Hist. Nat. Paris II. 4: 729. 1932.

Shrub or small tree with pilosulose branchlets. *Petioles* 2–3 mm. long. *Leaf blades* elliptic-oblong, (16–)20–30-jugate, the pairs of leaflets 2–5 mm. apart; rachis 5–14 cm. long, the wings ciliate, the axis pilosulose sparingly. *Leaflets* 5–20 mm. long, 1–5 mm. wide, linear, the upper side of the base subcordate, the lower side obtuse, the apex rotund, entire, mucronate, the upper surface glabrous or very sparsely puberulous on the blade, the costa sparsely puberulous at least at the base, the lower surface glabrous to pilosulose on the costa and on the apical half of the blade. *Inflorescences* 1–1.5 cm. long; bracts 2.5 mm. long, 1 mm. wide, triangular-lanceolate; bracteoles elliptic, 5–6 mm. long, 2.5–3 mm. wide, the outer surface puberulous, pilose within. *Sepals* 1.5–3 mm. long, 0.5–1.5 mm. wide. *Petal* blade 3.5 mm. long, about 5 mm. wide, the claw 4.5–5 mm. long. *Filaments* 17–19.5 mm. long. *Style* 18–19.5 mm. long, villosulose basally. *Ovary* oblong, villose marginally, the gynophore 2 mm. long, villosulose, inserted about midway on the adaxial wall of the hypanthium. *Fruit* unknown.

LECTOTYPE: *A. Ducke 20318* (flowering portion), "ad Cachoeira do Mindu, Manáos," Amazonas, Brazil, Oct. 1927 (deposited RB, isolectotypes F-frag., G, P, U, US). The fruiting portion of this collection, collected in November of the same year and in the same locality, appears to be somewhat intermediate between var. *debile* and the typical variety, which it most closely resembles. It does not have the entire, mucronate leaflet apices of var. *debile* and the distribution of the pubescence is much nearer that of the typical form. A lectotype has been chosen in this case because under the International Code of Botanical Nomenclature it is not permissible that a type be composed of more than a single collection.

Additional Specimens: BRAZIL: Amazonas: Cachoeira do Mindu, Manáos, Aug. 1935, *Ducke 14* (A, F, IAN, MO, NY, US); ad Cachoeira do Mindu, Manáos, Nov. 1927, *Ducke 20318* (fruiting) (G, P, RB, U).

2d. Macrolobium gracile var. gracile. Figure 3.

Vouapa gracilis (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 393. 1891.
Vuapa gracilis (Spruce ex Benth.) Kuntze, Rev. Gen. 1: 213. 1891.
Macrolobium tenue Ducke, Bol. Téc. Inst. Agron. Norte [Belém] 2: 13. 1944.

Slender tree 4–18 m. tall, the branchlets pilose. *Stipules* (3–)5–6 mm. long, 0.5 mm. wide, subulate, ciliolate. *Petioles* 1.5–3 mm. long. *Leaf blades* oblong or oblong-lanceolate, (10–)15(–20)-jugate, the pairs (2–)5(–8) mm. apart; rachis (4–) 8(–11.5) cm. long, pilosulose. *Leaflets* (4–)10–11(–22) mm. long, (2–)3(–8) mm. wide, oblong, the upper side of the base subcordate to cordate, the lower side acute, the apex rotund or rotund-truncate, retuse to emarginate, usually minutely apiculate; upper surface usually generally pilosulose, or pubescent only at the base and on the costa, or rarely completely glabrous, beneath generally pilose with the apical-lateral surface of the costa more densely pubescent, sometimes pubescent only on the upper half of the blade and the costa. *Inflorescences* 1–2 cm. long; bracts 1.5–2.5 mm. long, 1 mm. wide, triangular-lanceolate or triangular; pedicels 1–3 mm. long; bracteoles oblanceolate, elliptic, or oblong, (5–)6.5–7.5 mm. long, (2–)2.5–3 mm. wide, acute to acuminate, pilosulose on the outer surface, pilose within, sometimes sparingly so. *Sepals* somewhat dimorphic, the adaxial pair triangular to lanceolate, 1.5–2 mm. long, 0.5–0.8 mm. wide, the others 2–3.5 mm. long, 1 mm. wide, lanceolate. *Petal* blade 2.5–4 mm. long, 3–5 mm. wide, transversely oval to orbicular. *Filaments* 15–20 mm. long, villosulose basally. *Style* 16.5–18 mm. long, villosulose basally. *Ovary* fusiform, villose marginally, the gynophore 2–3 mm. long, villose, inserted at the base of the hypanthium. *Fruit* (immature) 5.5–8 cm. long, 3–5 cm. wide, oblong-obovate, sparingly pilose marginally, the carpophores (8–)11–16 mm. long, sparingly pilose.

LECTOTYPE: *R. Spruce 2659* (flowering portion), near "Panure," Rio Uaupês, Brazil, Oct. 1852 (deposited K, isolectotypes G, GH, NY, P, US, W). Since a type was not designated by the original author, one of the two collections cited by him has been chosen as the lectotype collection. Even the lectotype sheet bears material of two collections and the flowering portion alone is designated as the lectotype. The fruiting material is considered to be the same as the flowering and was collected in January 1853 in the same locality.

Additional Specimens: BRAZIL: Amazonas: upper Rio Negro, Camanaos, Sept. 1935, *Ducke 33* (A, F, MO, NY, US); circa Cachoeira do Mindu, Manáos, Dec. 1941, *Ducke 855* (F, IAN, MO, NY, US); Esperança, ad ostium flum. Javary, March 1942, *Ducke 1025* (type collection of *M. tenue* Ducke) (IAN, MO, NY, RB, US); São Paulo de Olivença, April 1944, *Ducke 2093* (IAN); super Rio Negro, Camanaos, Nov. 1932, *Ducke (H.J.B.R. No.) 23297* (RB, U, US); on plateau between Rio Livramento and Rio Ipixana, Municip. Humaytá, Nov. 1934, *Krukoff 7197* (A, F, MO, NY, U, US); ad flum. Casiquiari, Vasiva et Pacimoni, 1853–54, *Spruce 3410* (F, GH, MO, NY, P, US, W). PERU: *Dombey s.n.* (P). VENEZUELA: San Carlos de Río Negro, Amazonas, March 1942, *Williams 14630* (F, US, VEN).

Vernacular Name: "cipoal" (Brazil).

Of the specimens cited, *Ducke 1025* should receive some special attention, since it is the type collection number of *M. tenue* Ducke. It has been included in the typical variety in spite of some differences between it and the remainder of the material. However, these differences are so minute and apparently insignificant that there appears to be no point in recognizing this variant as a distinct taxon of any category. The rachis of the leaves is puberulous on the upper surface instead of pilosulose, the bracts oblong-ovate instead of more or less triangular, and the pubescence of the bracteoles and of the ovary margins is somewhat shorter. Considering the rather variable nature of these characters in this species, it is impossible to maintain *M. tenue* even as a variety.

Macrolobium gracile is a rather polymorphic species, but the diversity in its characters is not insoluble. It differs from *M. brevense*, its nearest relative, by the pilosulose inflorescences, flexuose-pilosulose and pilose outer surfaces of the bracteoles of the latter. The costa of *M. brevense* is strongly salient on the upper surface, which is not true of *M. gracile* except in its var. *machadoense* and the latter has a strongly lanceolate leaf outline. Both vars. *machadoense* and *confertum* have inflorescences which are longer than those of the other two varieties and similar in length to those of *M. brevense*. There are a number of other more distant relatives of the species under discussion, which appear to have diverged from the main multijugate line of relationship and which are related to *M. gracile* through *M. brevense*.

There are four moderately well-marked varieties comprising the species. Var. *debile* and the typical variety are at once distinguishable from the others by their very short, insignificant, few-flowered inflorescences. Var. *debile* is separable from the other one by the leaflet apices and the proportions and numbers of the leaflets. The characters separating the other two varieties from each other are of the same nature. The leaflets of var. *confertum* are narrower in proportion to their length than in the other variety; the leaflet costa is plane to impressed on the upper surface, as opposed to strongly salient; the leaflet apices are rotund, entire to retuse and are distinctly narrower than their bases, in contrast to the truncate, emarginate apices of the oblong leaflets of its relative; and the leaves are oblong-lanceolate, as opposed to the lanceolate ones of var. *machadoense*. Also, the fruit of the latter is much longer than that of its relative.

3. **Macrolobium machaerioides** Killip & Macbr. Field Mus. Publ. Bot. **13**(3): 139. 1943. **Figure 3.**

Small tree 2-12 m. tall, the branchlets sparingly pilosulose, sometimes also densely uncinate-puberulous. *Stipules* 5.5 mm. long, 0.5 mm. wide, subulate-linear, ciliolate. *Petioles* 2.5-3.5 mm. long, canaliculate, pilosulose. *Leaf blades* lanceolate-oblong, 13-21-jugate, the pairs of leaflets 3.5-8 mm. apart; rachis 6.5-14.5 cm. long, above with numerous uncinate hairs on the wing margins and on the axis, below more or less pilosulose. *Leaflets* 5-25 mm. long, 2-9 mm. wide, oblong, the base inequilateral, the upper side strongly angular-auriculate, the apex strongly emarginate, the upper surface uncinate-puberulous on the costa, otherwise glabrous, beneath strongly pruinose and glabrous or pilose on and along the costa, the latter plane to impressed above, salient beneath, the venules obscure. *Inflorescences* 1.5-3 cm. long, the axis minutely puberulous, the peduncles 1-2 mm. long; bracts 1.5-2 mm. long, 1 mm. wide, triangular, acute, ciliolate, glabrous or sparsely puberulous within at the base, puberulous externally; pedicels 1-2 mm. long, puberulous; bracteoles 4-5 mm. long, 2-2.5 mm. wide, oblong, externally short-pilosulose and puberulous, within villose. *Hypanthium* 1 mm. long, sessile, glabrous. *Sepals* five, 1.5-2.5 mm. long, 1-1.5 mm. wide, the adaxial pair triangular to triangular-lanceolate, sometimes partly united, the others oblong to lanceolate, acute or obtuse, glabrous. *Petal* blade 3-4 mm. long, 4.5-5 mm. wide, oval transversely, the claw 4 mm. long, more or less auriculate basally, villosulose on the claw externally and sometimes upon the back of the blade, villosulose within on the claw and up to the center of the blade, ciliolate at the base of the claw. *Filaments* 13-16 mm. long, villose throughout most of length. *Stigma* capitellate. *Style* 15 mm. long, villosulose basally. *Ovary* 1.5 mm. long, 1 mm. wide, oval, villose marginally, the lateral surfaces glabrous, 2-ovulate, the gynophore 2-2.5 mm. long, villose, inserted at the base of the hypanthium. *Fruit* unknown.

Type Collection: *G. Klug 547*, "Mishuyacu, near Iquitos," 100 m., Dept. Loreto, Peru, Oct.-Nov. 1929 (HOLOTYPE US, isotypes F-frag., NY).

Additional Specimens: Maranon River from Iquitos to the mouth of the Río Santiago at Pongo de Manseriche, ca. 77° 30′ West, Peru, 1924, *Tessmann 4157* (G, NY).

There can be little doubt of the relationship of this species to the *M. gracile* complex. As was mentioned above, there are a number of species which are related to the latter species with M. *brevense* as an intermediate relative. M. *machaerioides*, however, appears to be much more intimately related to M. *gracile* and probably had its origin independently of the other more remotely related species. It is most easily recognized by the angular-auriculate upper side of the leaflet base and by the strongly emarginate leaflet apices.

4. **Macrolobium brevense** Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 50. 1925. **Figure 3.**

Large tree 20–30 m. tall, the branchlets pilose and puberulous. *Stipules* 4.5 mm. long, caducous, subulate, acuminate, ciliolate. *Petioles* 2–4 mm. long, pilose or pilosulose. *Leaf blades* elliptic-oblong to oblong-lanceolate, 18–27-jugate, the pairs of leaflets 3–6 mm. apart; rachis 5.5–11.5 cm. long, the wings ciliolate, sparsely pilosulose on the upper surface, glabrous beneath, the axis uncinate-puberulous on the upper surface, sparingly pilosulose or glabrous beneath. *Leaflets* (1.5–)5–20 mm. long, 1–7 mm. wide, the upper ones minute, oblong, the base inequilateral, the upper side obtuse to cordate, the lower side subobtuse, the apex rotund, emarginate, minutely apiculate; upper surface glabrous except for arcuate or uncinate hairs on the costa, beneath glabrous or the costa with very few hairs; costa strongly salient, the venules obscure on the upper surface, subprominulous beneath. *Inflorescences* 2–5.5 cm. long, the axis densely short-pilosulose, the peduncle 2–3 mm. long; bracts 2 mm. long, 1 mm. wide, caducous, triangular, acute, glabrous within, pilosulose externally; pedicels 1.5–3 mm. long; bracteoles 5–5.5 mm. long, 2.5–3.5 mm. wide, oblong or oblong-obovate, subappressed flexuose-pilosulose and pilose on the outer surface, villose within. *Hypanthium* 1.5 mm. long, sessile, glabrous or sometimes with few hairs. *Sepals* five, 1.5–3 mm. long, 1–1.5 mm. wide, triangular-lanceolate, ciliate apically. *Petal* blade 4–5 mm. long, 3–4.5 mm. wide, orbicular, the claw 4.5–7.5 mm. long, glabrous within, villosulose externally. *Filaments* about 12 mm. long, villosulose in the lower part. *Stigma* simple or subcapitellate. *Style* about 15 mm. long, pilosulose basally. *Ovary* 2–2.5 mm. long, 1–1.5 mm. wide, oblong to oblong-oblanceolate, 3–4-ovulate, marginally pilose, the lateral surfaces glabrous, the gynophore 2.5 mm. long, pilose, inserted at the base of the hypanthium. *Fruit* (submature) 13.5 cm. long, 4–4.5 cm. wide, oblong, glabrous, the carpophores about 10 mm. long, glabrous.

LECTOTYPE: *A. Ducke (H.J.B.R. No.) 16946* (flowering portion), "Breves, aestuario amazonico, civ. Pará, silva primaria circa campinam arenosam," July 1923 (deposited U, isolectotype US). The fruiting portion of this collection was collected in the same locality but on a much earlier date, December 1922. Both the flowering and fruiting material is considered to be representative of this species.

The selection of a lectotype was necessary here because Ducke, in his original description, cited only a single collection, which under most circumstances would be considered as the holotype. However, it really included two collections, and the International Rules provide that in such a situation a lectotype must be chosen.

Additional Specimens: BRAZIL: Esperança ad ostium flum.. Javary, Amazonas, Jan. 1942, *Ducke 899* (F, IAN, MO, NY, US); Breves, civ. Pará, Aug. 1926, *Ducke (H.J.B.R. No.) 16946-A* (F-frag., G, NY, P, RB, U, US). The latter collection has previously borne the number "16946" which is the number of the lectotype collection. The number has been emended to read as shown above to avoid future confusion.

The geographic distribution of this species is rather surprising but entirely understandable in a region so poorly known floristically. Its type locality is Breves (from which locality the specific epithet is drawn) in the mouth of the Amazon River and is known elsewhere only from Esperanca, Amazonas in the upper part of the Amazon Basin. It may be safely assumed that the range of the species is the length of the basin and simply has not been collected at stations intermediate between the two geographic extremes.

Macrolobium brevense appears to be a phylogenetic node from which at least two divergent lines have originated. It apparently occupies an intermediate position between these two lines and *M. gracile*. It is most nearly allied to variety *machadoense* of the latter species, and of the species in the two related lines of relationship, it is undoubtedly most nearly related to *M. huberianum*. From *M. gracile* var. *machadoense*, *M. brevense* may be most readily separated by the shape of the leaf blades and the pubescence of the inflorescence. It is amply distinct from *M. huberianum* by the glabrous bracteoles, longer pedicels, and persistent stipules of the latter species.

5. **Macrolobium huberianum** Ducke, Arch. Jard. Bot. Rio de Janeiro 1: 26. 1915. **Figure 3.**

Tall shrub or small tree 4–6 m. tall, 4–10 cm. in diameter, the branchlets puberulous and pilosulose. *Stipules* 3.5–10 mm. long, 0.5–1.5 mm. wide, persistent, subulate, linear, elliptic, or lanceolate, acute or acuminate, glabrous within, puberulous externally, ciliolate. *Petioles* 2–4 mm. long, puberulous or pilosulose. *Leaf blades* oblong or lanceolate-oblong, 10–23-jugate, the pairs of leaflets 3–7 mm. apart; rachis 4.5–9.5 cm. long, puberulous above, sometimes uncinately so, the wings glabrous beneath but the axis puberulous or pilosulose. *Leaflets* 7–21 mm. long, 2.5–7 mm. wide, oblong, the base inequilateral, the upper side subcordate to cordate, the lower side acute to obtuse, the apex rotund, entire or very slightly retuse, minutely apiculate; upper surface glabrous or more or less puberulous on the costa, the hairs often uncinate, beneath appressed-pilosulose on the costa, rarely also on the blade; costa slightly impressed or plane on the upper surface, salient beneath, the venules obscure to subprominulous. *Inflorescences* 3–11 cm. long, the axis glabrous or pilosulose, the peduncles 2–6 mm. long; bracts 3.5–5.5 mm. long, 1–1.5 mm. wide, lanceolate, acuminate, glabrous except for the sparsely ciliolate margins; pedicels 3.5–8 mm. long, glabrous or puberulous; bracteoles 6–10 mm. long, 3–5.5 mm. wide, elliptic, glabrous. *Hypanthium* 2–2.5 mm. long, glabrous or sparingly pilosulose basally, sessile or with a stipe 0.5 mm. long. *Sepals* five, 2–6 mm. long, 1–2.5 mm. wide, glabrous or apically ciliate, oblong, oblong-elliptic, lanceolate or linear-lanceolate. *Petal* blade 4.5–6.5 mm. long, 4.5–8 mm. wide, orbicular to transversely oval, the claw 5–7 mm. long, auriculate basally, villosulose externally at the base, ciliolate on the claw, villosulose within on the claw and on the costa of the blade. *Filaments* 20–30 mm. long, the lower part villosulose. *Stigma* capitellate. *Style* 18–23.5 mm. long, sparsely pilosulose at the base. *Ovary* 2.5–3.5 mm. long, 1–1.5 mm. wide, linear to oblanceolate, glabrous or with a few hairs on the abaxial suture or pilosulose marginally, 3–5-ovulate, gynophore 2.5–5.5 mm. long, glabrous to pilosulose, inserted at the apex of the adaxial wall of the hypanthium. *Fruit* (immature) 6–7 cm. long, 2–3.5 cm. wide, oblong to falcate, glabrous, the carpophores 8–10 mm. long, glabrous to sparsely pilosulose, the seeds 1–2 per fruit.

Key to the Varieties of *Macrolobium huberianum*

1. Stipules 7.5–10 mm. long; leaves lanceolate-oblong; inflorescence axis pilosulose, pedicels short-pilosulose or puberulous; sepals 5–6 mm. long, 1.5–2.5 mm. wide; ovary marginally pilosulose, lateral surfaces glabrous. .... 5a. var. *pubirachis*.
1. Stipules 3.5–4 mm. long; leaves oblong; inflorescence axis and pedicels glabrous; sepals 2–4.5 mm. long, 1–1.5 mm. wide; ovary subglabrous with few hairs on the abaxial margin. .... 5b. var. *huberianum*.

5a. Macrolobium huberianum var. pubirachis Amshoff, Bull. Torrey Club 75: 389. 1948. **Figure 3.**

Tree 4–6 m. tall, 4–10 cm. in diameter. *Stipules* 7.5–10 mm. long, 1–1.5 mm. wide, linear to elliptic or lanceolate, arcuate to falcate, acuminate. *Petioles* 2–3 mm. long, pilosulose. *Leaf blade* lanceolate-oblong, 10–19-jugate. *Inflorescence* 4–11 cm. long, the axis pilosulose; pedicels 4.5–8 mm. long, puberulous; bracteoles 8.5–10 mm. long, 4–5.5 mm. wide. *Sepals* 5–6 mm. long, 1.5–2.5 mm. wide. *Petal claw* 6–7 mm. long. *Ovary* pilosulose on the margins, the lateral surfaces glabrous. Only immature fruit known.

Type Collection: *B. Maguire & D. B. Fanshawe 23507*, "Kaieteur Plateau, Potaro River below Tukeit," British Guiana, May 1944 (HOLOTYPE NY, isotypes F, MO, U, US).

Additional Specimens: BRITISH GUIANA: Potaro R., below Tukeit, June 1944, *Fanshawe 1945* (F.D. 4681) and May 1944, *Fanshawe 1954* (F.D. 4690) (BGF); Potaro R., Tumatumari, July 1921, *Gleason 335* (GH, NY, US); Kaieteur Plateau, Potaro R., below Tukeit, May 1944, *Maguire & Fanshawe 23491* (F, NY, U, US).

Vernacular Name: "sarabebe."

Gleason 335 is not entirely satisfactorily placed, for in some respects it is intermediate between the two varieties. In most of its characters, however, it agrees most completely with var. *pubirachis*; for this reason and because it was collected within its range, it has been assigned to this variety.

5b. Macrolobium huberianum var. huberianum. Figure 3.

Tree or tall shrub. Stipules 3.5–4 mm. long, 0.5–1 mm. wide, subulate, acute. *Leaf blades* oblong, 12–23-jugate, the pairs 3–5 mm. apart; rachis puberulous but sparingly so beneath. *Leaflets* 10–20 mm. long, 3–6 mm. wide, the upper side of the base subcordate, the lower side acute. *Inflorescences* 3–8 cm. long, the axis glabrous; pedicels 3.5–6 mm. long, glabrous; bracteoles 6–8 mm. long, 3–4 mm. wide. *Sepals* 2–4.5 mm. long, 1–1.5 mm. wide, lanceolate to linear-lanceolate, glabrous. *Ovary* with few hairs on the abaxial margin.

LECTOTYPE: *A. Ducke (H.A.M.P. No.) 11874*, "puisseau de la region des campos de l'Ariramba, Rio Trombetas," Pará, Brazil, June 1912 (on deposit at Museo Goeldi, isolectotypes F-frag., G, US). The material of this genus in the Museo Goeldi, Belém, Brazil, has not been available for study.

Additional Specimens: BRAZIL: Pará: Cultivated in grounds of Belém Museum, introduced from Rio Ariramba (trib. Rio Trombetas), April 1940, *Ducke 589* (F, IAN, MO, NY, US); same locality data, April 1946, *Ducke 1935* (F, GH, IAN, NY, US); same locality data, April 1923, *Ducke (H.J.B.R. No.) 10921* (F-frag., G, NY, RB, U, US); Rio Ariramba region, near Rio Jaramacaru, Dec. 1911, *Ducke 11354* (F-frag., G); cultivated in Belém Museum grounds, introduced from Rio Ariramba, May 1918, *Ducke 17023* (P); Rio Capim, March 1949, *Froes & Pires 24167* (IAN, NY).

BRITISH GUIANA: Potaro River, Feb. 1879, *im Thurn, s.n.* (K).

This species exhibits characters which closely relate it to *M. longipedicellatum*. The characters of *M. huberianum* which serve to distinguish it are: (1) its stipules are persistent; (2) its leaf blades are oblong to lanceolate-oblong; (3) its leaflets are rotund and entire or subentire at the apex; and (4) it has much smaller bracts.

It also shows considerable relationship to *M. brevense* but it is amply separated from this species by its persistent stipules, glabrous bracteoles, and longer pedicels.

The two varieties composing the species are quite distinct and readily recognizable. Var. *pubirachis*, as the specific epithet implies, has a pubescent inflorescence axis but it also has stipules which are at least twice as long as in the typical variety and its ovary is marginally pilosulose.

6. **Macrolobium longipedicellatum** Ducke, Arch. Inst. Biol. Veg. Rio de Janeiro 2: 40. 1935. **Figure 3.**

Tree, the branchlets pilosulose. *Petioles* 3–4 mm. long, canaliculate, sparsely pilosulose. *Leaf blades* elliptic or lanceolate, 11–15-jugate, the pairs of leaflets 4–6 mm. apart; rachis 4.5–7.5 cm. long, the wings ciliate, sparsely puberulous above toward the base, glabrous beneath, the axis pilosulose or glabrous above. *Leaflets* 5–18 mm. long, 3–6.5 mm. wide, oblong, the base inequilateral, the upper side subcordate, the lower side obtuse, the apex truncate, retuse or emarginate, apiculate, glabrous or subglabrous on the upper surface, pilose on the costa beneath, the costa impressed above, salient beneath, the venules obscure. *Inflorescences* 3.5–6 cm. long, the axis glabrous, the peduncles 1.5–3 mm. long; bracts 8 mm. long, 2.5 mm. wide, persistent almost to anthesis, lanceolate, acuminate, ciliolate apically but otherwise glabrous; pedicels 6–7 mm. long, glabrous; bracteoles 8.5 mm. long, 4.5 mm. wide, glabrous, broadly elliptic. *Hypanthium* about 2 mm. long, glabrous. *Sepals* five, the adaxial pair partly united, 5–5.5 mm. long, 2–2.5 mm. wide, oblong or oblong-elliptic, apically ciliolate. *Petal* blade 6 mm. long, 5 mm. wide, suborbicular, the claw 6 mm. long, strongly alate, pilosulose and ciliolate externally at the base of the claw, villosulose within on the claw and into the throat of the blade. *Filaments* 23 mm. long, villosulose in the lower part. *Stigma* capitellate. *Style* at least 21 mm. long, glabrous. *Ovary* 2.5 mm. long, 1 mm. wide, linear-oblong, glabrous or with very few hairs on the abaxial suture near the base, 3-ovulate, the gynophore 4.5 mm. long, villosulose, inserted at margin of the hypanthium. *Fruit* unknown.

Type Collection: *A. Ducke (H.J.B.R. No.) 24067*, "São Paulo de Olivenca, Rio Solimoes," Brazil, Feb. 1932 (HOLOTYPE RB, isotypes F-frag., NY, P, U, US). Known only from the type collection.

The close relationship of this species with *M. huberianum*, particularly var. *huberianum*, is obvious. *M. longipedicellatum* differs from its closest ally in having caducous stipules, elliptic or lanceolate leaf blades, differently shaped leaflet apices and very much larger bracts.

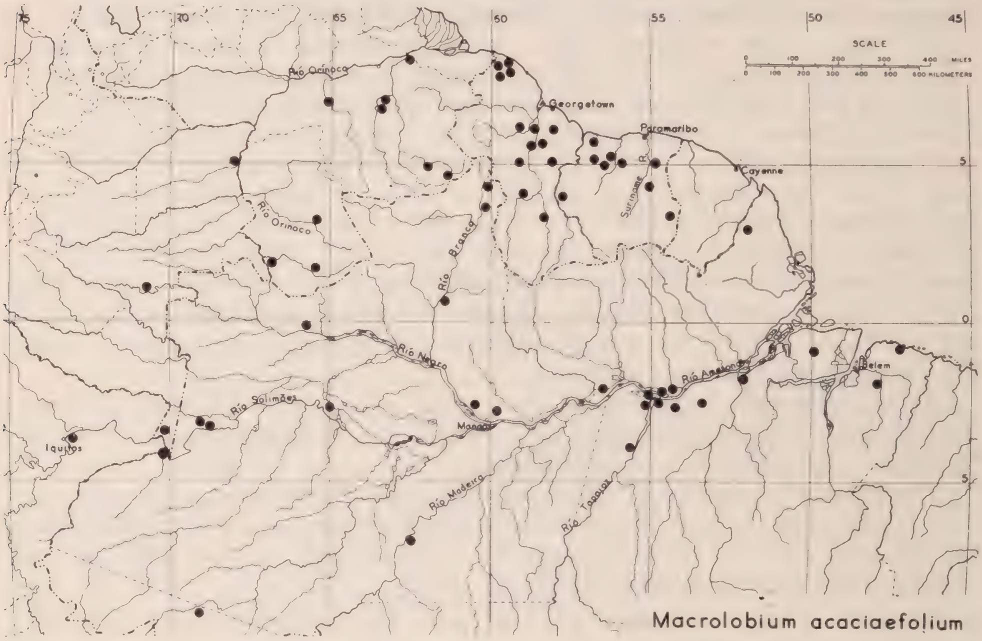
7. **Macrolobium longeracemosum** Amshoff, Bull. Torrey Club 75: 389. 1948. **Figure 3.**

Tree to 8 m. tall, 1.5 dm. diameter, the branchlets pilosulose and puberulous. *Petioles* 3–6 mm. long, sulcate or canaliculate, short-pilosulose. *Leaf blades* oblong, 12–19-jugate, the pairs of leaflets 4–8 mm. apart; rachis 5–12 cm. long, more or less pilosulose. *Leaflets* 8–30 mm. long, 3–7 mm. wide, oblong, the base inequilateral, obtuse, the apex rotund, retuse to emarginate; upper surface darkly lustrous and glabrous except uncinate-puberulous basally on the costa, beneath strongly glaucous, sparingly pilose basally on the costa, especially on the apical-lateral surface; costa distinctly salient, the venules subprominulous above, obscure beneath. *Inflorescences* 3–12 cm. long, the axis pilosulose, the peduncle 2–4 mm. long; pedicels 1.5–3 mm. long, lanulose-puberulous; bracteoles 5.5 mm. long, 4 mm. wide, obovate, lanulose-puberulous externally, glabrous within. *Hypanthium* 2 mm. long on a stipe about 0.5 mm. long, sparsely pilosulose. *Sepals* five, the adaxial pair partly united, 3–4 mm. long, 1–1.5 mm. wide, ciliolate apically. *Petal* blade 4 mm. long, 4.5 mm. wide, obovate, glabrous, the claw 5.5 mm. long, strongly auriculate, puberulous sparingly on the auricles. *Filaments* about 18 mm. long, glabrous. *Stigma* capitellate. *Style* about 20 mm. long, sparsely pilosulose basally. *Ovary* 3 mm. long, 1.5 mm. wide, oblong or oblong-oblanceolate, marginally pilosulose, the lateral surfaces glabrous, 2-ovulate, the gynophore 2.5 mm. long, sparsely pilosulose. *Fruit* (immature) 11 cm. long, 3 cm. wide, oblong or oblong-oblanceolate, sparsely pilosulose basally on the margins, the carpophores 8–10 mm. long, pilosulose.

Type Collection: *B. Maguire 24650*, "overhanging upper Augustus Creek, Tafelberg, Surinam," Sept. 1944 (HOLOTYPE NY, isotypes F, MO, U, US).

Additional Specimens: BRITISH GUIANA: Makreba Falls, Kurupung River, Sept. 1938–Feb. 1939, *Pinkus 258* (F, G, GH, MO, NY, US).

This species finds its nearest relative in *M. acaciaefolium*, but it is amply distinct both vegetatively and in its flowers and fruit. Its costa is strongly salient on both surfaces of the leaflets and its dark, shiny upper surface of the leaflets and the strongly glaucous under surface contrast sharply. In respect to the flowers, the lanulose puberulence of the bracteoles is distinctive. The fruit of *M. acaciaefolium* is oval, oblong-oval or nearly orbicular, whereas those of *M. longeracemosum* are oblong and about three to four times as long as wide.


75
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SCALE
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Rio Negro
Rio Amazonas
Belem
Rio Solimões
Iquitos
Manaos
Rio Madeira
Rio Tapajoz
5
Macrolobium acaciaefolium

FIG. 4. Geographic distribution of *M. acaciaefolium.*

8. **Macrolobium acaciaefolium** (Benth.) Benth. in Mart. Fl. Bras. 15(2): 224. 1870. Figure 4.

Outea acaciaefolia Benth. Jour. Bot. Hook. 2: 94. 1840.
Vouapa acaciaefolia (Benth.) Baill. Hist. Pl. 2: 109. 1870.
Vuapa acaciaefolia (Benth.) Kuntze, Rev. Gen. 1: 213. 1891.
Macrolobium acaciaefolium (Benth.) Benth. var. *vestitum* Sandwith, Kew Bull. **1948**: 312. 1948.

Tree with rather flattened, expanded crown, 3–30 m. tall, 8–100 cm. diameter, the branchlets glabrous to densely pilosulose. *Petioles* (2–)6–7(–12) mm. long, canaliculate. *Leaf blades* oblong, elliptic-oblong or lanceolate-oblong, (12–)15–20 (–28)-jugate, the pairs of leaflets (3–)5–7(–12) mm. apart; rachis (6.5–)10–14(–24) cm. long, glabrous or the axis puberulous or pilosulose on the upper surface and pilosulose beneath, the wings only cioliolate or the upper surface also puberulous or pilosulose, glabrous beneath. *Leaflets* (7–)20–25(–40) mm. long, (2–)5–7(–11) mm. wide, the uppermost leaflets smallest, oblong, the base inequilateral, the upper side subobtuse to cordate, the lower side acute to obtuse, the apex rotund, retuse to emarginate, usually minutely apiculate; upper surface usually shiny, glabrous, or puberulous to pilosulose on the costa or sometimes more or less puberulous on the blade also, the lower surface glabrous to more or less strongly golden-pilose on the apical-lateral surface of the costa, extremely rarely pilosulose on part or all of the blade; costa impressed on the upper surface, salient beneath, the venules obscure to prominulous. *Inflorescences* (1–)2(–6) cm. long, densely grayish-pilosulose, infrequently with one basal branchlet, the peduncles (when present) about 4 mm. long; bracts caducous, (1.5–)3.5(–6) mm. long, (1–)2.5(–5) mm. wide, broadly ovate to oval, or oblong, concave, acute to cuspidate-acute, ciliolate, glabrous or rarely minutely strigulose near the base within, densely pilosulose externally; pedicels (1.5–)2.5(–5) mm. long, densely pilosulose; bracteoles (3.5–)5(–7) mm. long, (1.5–)3(–4) mm. wide, concave, obovate to oval to ovate, glabrous within, densely pilosulose externally. *Hypanthium* 1–2 mm. long, sessile or with a stipe 0.5 mm. long, glabrous or sparsely pilosulose basally. *Sepals* five, the adaxial pair partly united, 2.5–6.5 mm. long, 1–3.5 mm. wide, oblong to lanceolate, obtuse, acute, or acuminate, glabrous or rarely ciliolate sparsely at the apex. *Petal* blade 3–5.5 mm. long, 5–7.5 mm. wide, transversely oval, rarely suborbicular, the claw 3–5.5 mm. long, more or less auriculate, glabrous externally, villosulose within on the claw and over the center of the blade or the blade totally glabrous, the claw ciliolate in the lower part; 1–4 petalodia often present, to 5 mm. long, linear. *Filaments* (12–)15(–20) mm. long, glabrous. *Stigma* capitellate. *Style* (9–)15(–20) mm. long, basally pilosulose. *Ovary* 2–3 mm. long, 1–1.5 mm. wide, oblong to oval or oblong-obovate, (1–)2(–3)-ovulate, the margins pilosulose, the lateral surfaces glabrous; gynophore 1–2.5 mm. long, pilosulose, the hairs usually directed basally, inserted at the base of the hypanthium or sometimes up to midway on its adaxial wall. *Fruit* indehiscent, 4.5–7 cm. long, 3–5.5 cm. wide, oblong to orbicular, flat, the adaxial margin thicker than the abaxial and sulcate, sparsely pilosulose on the margins, the carpophores 1–2.5(–6) mm. long, pilosulose. *Seeds* one per fruit, 3–4.5 cm. long, 2–3.5 cm. wide, flat, oval or oblong, the testa crustose, tan-brown to black, irregularly salient-venose.

Type Collection: *Robt. Schomburgk 521*, "Rooponoony and Essequibo Rivers," 1838 (HOLOTYPE K, isotypes BM, F, G, K, P, US, W).

Additional Specimens: BRAZIL: *Burchell 9141* (GH); Rio de Janeiro, *Glaziou 13755* (P). Pará: Rio Mapua, Canta Galo, municip. de Breves, July 1950, *Black, Froes & Ledoux 50-9875* (NY); near Rio Jumunda, São Jorge, municip. Faro, Nov. 1950, *Black & Ledoux 50-10700* (IAN); Tapajóz, Bôa Vista, July 1932, *Capucho 341* (F, IAN); Igarapé de Irera, near Santarém, Aug.–Sept. 1938, *Dahlgren s.n.* (F, US); Bôa Vista, Rio Tapajóz, June 1929, *Dahlgren & Sella 110* (F, US), *190* (F, NY); Oyapoc, June 1904, *Ducke 4775* (G); Lago de Faro, Aug. 1907, *Ducke 8398* (G); Rio Tapajóz, first rapids (S. Luiz), Dec. 1915, *Ducke 15815* (G, US); Rio Oiapoque, Terr. Amapá, Feb. 1950, *Froes 25911* (IAN, NY); Marabá, Rio Itacaiuna, June 1949, *Froes & Black 24385* (IAN, NY); Rio Purús, June 1903, *Goeldi 3901* (G, US); Bas Xingú, Dec. 1903, *Goeldi 4152* (G); Rio Maracá, July 1896, *Guedes 614* (G); Marajó, June 1896, *Huber 186* (G); Rio Capim, July 1897, *Huber 911* (G, US); Quatipuru, Dec. 1899, *Huber 1764* (G); Cassipa in Tapajóz R. region, Sept. 1931, *Krukoff 1238* (A, F, G, MO, NY, P, U, UC); Monte Alegre, July 1908, *Snethlage 9562* (G); Santarém, June 1850, *Spruce 920* (P); vic. Santarém, June 1850, *Spruce s.n.* (F-frag., G, GH, NY, P, W). Matto Grosso: Rio Santarém and Barbados, Jan.–Dec. 1928, *Riedel 1568* (A, NY); "Matto Grosso et Santarém," *Riedel s.n.* (A); Rio Guaporé, July 1942, *Sandeman 2143* (K). Amazonas; Tefé, beira do Chi-daruim, Aug. 1947, *Black 47-1208* (IAN, U); Rio Janeiro, Manaos, Aug. 1948, *Corner 8* (IAN, NY); São Paulo de Olivença, Rio Solimões, Igarapé Jaratuba, June 1940, *Ducke 340* (Y); Rio Negro ad flum. Apuahu, July 1941, *Ducke 757* (F, IAN, MO, NY, US); Manaos, Igarapé Guarita, April 1943, *Ducke 1228* (IAN, MO, NY, US); Lago de Teffé, June 1906, *Ducke 7369* (G); Rio Jatahy, Riosinho Juruema, June 1945, *Froes 21017* (IAN, NY); upper Rio Pacú, Terr. Rio Branco, March 1948, *Froes 23152* (IAN); Taperinha bei Santarém, 1927, *Ginzberger 700* (F); Cachoeira Caranguejo, Rio Cauabury, Dec. 1930, *Holt & Blake 546* (GH, NY, US); Terr. Acre, ca. mouth Rio Macauhan, Aug. 1933, *Krukoff 5599* (A, F, MO, NY, U, UC, US); Tres Casas, Municip. Humaytá, Oct. 1934, *Krukoff 6320* (A, F, MO, NY, U, US); São Paulo de Olivença near Palmares, Sept.–Oct. 1936, *Krukoff 8403* (G, MO, U, US); Assahytuba, Rio Branco, Jan. 1924, *Kuhlmann 1052* (H.J.B.R. No. 17663) (G, P, RB, U, US); São Marcos, upper Rio Branco, Sept. 1913, *Kuhlmann 3243* (U, US); Ega, Oct. 1831, *Poeppig 2724* (P, W); Serra de Mel, Rio Branco, Surumú, Sept. 1909, *Ule 8147* (G, UC).

PERU: Loreto: Mishuyacu near Iquitos, June 1930, *Klug 1417* (F, NY, US); "stromgebiet des Maronon von Iquitos aufwarts bis zur Santiago-Mundung de Manseriche ca. 77° 30′ West," 1924, *Tessmann 3673* (F-frag., G, NY); Manfinfa on upper Río Nanay, June–July 1929, *Williams 1098* (F, US); Caballo-Cocha on Amazon River, Aug. 1929, *Williams 2420* (F, G, US).

COLOMBIA: Vicinity Miraflores, Río Vaupés, Vaupes, Nov. 1945, *Allen 3394* (MO, US); Los Llanos, Río Orinoco, Puerto Carreño, Vichada, Oct. 1938, *Cuatrecasas 4008* (F, US); bocas del Carurú, Vaupes, Sept. 1939, *Cuatrecasas 7042* (F, US); Loretoyacu River, Nov. 1946, *Schultes & Black 8640* (US).

VENEZUELA: Margin of Río Orinoco, *Chaffanjon s.n.* (P). Bolivar: Mouth of Río Tonoro, alto Río Paragua, Aug. 1943, *Cardona 815* (NY, US, VEN); Raudal Uraima, alto Río Paragua, Sept. 1943, *Cardona 885* (F, NY, US, VEN); Río Caroní, from Kusaribara to mouth of Río Ikabaru, Sept. 1946, *Cardona 1649* (VEN); banks of Río Caroní and tributaries, Oct. 1947, *Cardona 2182* (US, VEN); alto Río Caroní, Jan. 1949, *Cardona 2564* (NY); Río Paragua between Río Tonoro and Salto de Auraima, April 1943, *Killip 37541* (UC, US, VEN); Río Paragua, Dec. 1951, *Maguire 32712* (F, K, NY, US, VEN); Río Uairén, Sta. Elena, Gran Sabana, March 1946, *Tamayo 3180* (VEN); La Unión, Río Caura, Feb. 1939, *Williams 11244* (F, US, VEN). Amazonas: Río Cunucunuma, just above Playa Alta, Nov. 1950, *Maguire, Cowan & Wurdack 29504* (F, G, GH, IAN, K, MO, NY, U, US, VEN); San Carlos, Río Negro, Feb. 1942, *Williams 14485* (F, US, VEN); Caño Macasi, Capihuara, alto Casiquiare, alt. 120 m., May 1942, *Williams 15596* (F, NY, US, VEN).

BRITISH GUIANA: Pomeroon Dist., Santa Rosa, Maruka R., Aug. 1921, *de la Cruz 995* (GH, NY, US); Acqueero Landing, Pomeroon Dist., Sept. 1921, *de la Cruz 1095* (GH, NY, US); Baramanni R., NW Dist., Sept. 1921, *de la Cruz 1137* (GH, NY, US); near Bartica on Essequibo R., Sept. 1922, *de la Cruz 1925* (F, GH, MO, NY, UC, US); Waramuri Mission, Moruka R., Pomeroon Dist., Oct. 1922, *de la Cruz 2583* (F, GH, MO, NY, UC, US); Waini R., NW Dist., April 1923, *de la Cruz 3738* (G, GH, MO, NY, UC, US); Assakatta, NW Dist., Sept. 1923, *de la Cruz 4373* (GH, MO, NY, UC, US); Mazaruni R., Oct. 1944, *Fanshawe 2012* (F.D. 4748) (TYPE COLLECTION of *M. acaciaefolium* var. *vestitum* Sandw., HOLOTYPE K, isotypes BGF, F, NY, U, US); Apoteri, Rupununi R., July 1931, *For. Dept. 2101* (BGF); Rockstone on Essequibo R., July 1921, *Gleason 874* (GH, NY, US); Berbice, below Koyeri Creek, Wurawa R., Canje R., Dec. 1914, *Hohenkerk (F.D. No.) 685* (BGF); Demerara R., Great Falls, June 1896, *Jenman 7172* (NY); Mallali, Oct. 1924, *Persaud 163* (F, NY); Essequibo R., at first falls, Sept. 1929, *Sandwith 222* (NY, P, U, US); Roraima, 1842–43, *Rich. Schomburgk 456* (P, W); British Guiana, *Rich. Schomburgk 737* (P); British Guiana, *Rich. Schomburgk s.n.* (U); Karenambo, Rupununi R. Basin, Oct. 1939, *A. C. Smith 2231* (A, F, G, MO, NY, U, US, Y).

SURINAM: Nickeri-Nanni Creek, Dohsen Savanna, Oct. 1941, *Geyskes 124* and *126* (NY, U); Kaboerie Kreek, Nickerie, June 1916, *Gonggrypp (For. Bur. No.) 2210* (U); Turco Tabbetje, fluv. Marowijne, July 1923, *Gonggrypp (For. Bur. No.) 5325* (U, US); Coppename R., near Kaaimanstone, Sept. 1933, *Lanjouw 704* (U, US); Corantijn, New R., Sept. 1935, *Rombouts 179* (MO, U); Litanie R., July 1937, *Rombouts 712* (IAN, U); Corantyn near Wonotobo, Oct. 1916, *Stahel & Gonggrypp (For. Bur. No.) 2534* (IAN, U); Kaboerie, Corantijn R., Oct. 1916, *Stahel & Gonggrypp (For. Bur. No.) 2988* (MO, U); fluv. Gonini, Aug. 1903, *Versteeg 120* (U).

Vernacular Names: Brazil: "arapary," "faveira arapury," "parapari"; Peru: "pashaquilla," "arapari"; Venezuela: "arepillo," "arepito."

This is an extremely variable species within which there may even be some subspecific taxa, but no constant characters have been discovered in this study which could be used to distinguish them.

In vesture there is marked variability. The leaflets are typically pubescent on the costa on the upper surface and on the apical-lateral surface of the costa beneath. However, collections from eastern Peru and Colombia have the upper half of the blades more or less pubescent beneath. This pubescence distribution might be of some taxonomic use, were it more constant and correlated with other more significant differences. Unfortunately, such is not the case, for this character appears to vary independently of all others. Collections which exhibit this pubescence distribution are: *Tessmann 3673, Schultes & Black 8640, Cuatrecasas 4008* and *Allen 3394*. In the upper Rio Negro country a form occurs which is completely pilose on the undersurface of the leaflets, represented by *Williams 14485* and *Maguire, Cowan, & Wurdack 29504*. However, this is the only distinguishing character and is considered to be only one extreme in the pubescence variation pattern.

There is another variant group with no geographic or morphologic character other than that it has generally larger leaflets. As with the pubescence, it is held that no useful purpose is served by the recognition of subspecific taxa in what appears to be a continuous system of variability.

Var. *vestitum*, here treated as a synonym of this species, was described by Sandwith to include that portion of the species which exhibits pubescent branchlets but even the type collection shows scattered hairs on the branchlets of some of the sheets observed. Actually, the branchlets may be glabrous, pilosulose in a small area just above each node, sparsely but generally pilosulose, or densely pilosulose.

This species is so similar to *M. longeracemosum* in aspect that some of the material of that species had been determined as *M. acaciaefolium* and there is no doubt that the two are intimately related. They are, however, separable on a number of characters both in the vegetative phase and in the reproductive structures. Whereas *M. longeracemosum* has the leaflet costa strongly salient on the upper surface, in the present species it is impressed. Also, the leaflets of *M. acaciaefolium* do not display the sharply contrasting dark-lustrous upper surface and strongly glaucous undersurface as do those of *M. longeracemosum*. The pubescence of the bracteoles and pedicels of the latter is quite different from that on the same structures in *M. acaciaefolium*. The fruits of the latter are oval, oblong-oval, or orbicular, and indehiscent, in contrast to the elongate-oblong fruits produced by its nearest relative.

9. **Macrolobium froesii** Cowan, sp. nov. Figure 5.

Arbor 10 m. alta, 15 cm. diametro, ramulis dense pilosulis. Stipulae circa 10–15 mm. longae, 1 mm. latae, caducae, lineares, caudato-acuminatae, extus pilosulae, intus glabrae. Petioli 3–4 mm. longi, pilosuli. Foliorum lamina lanceolato-oblonga, 7–20-jugata, paribus 5–9 mm. separatis; rachibus 9–15 cm. longis, supra puberulis, infra pilosulis. Foliola 10–30 mm. longa, 5–10 mm. lata, oblonga, ad basim inaequilateralia, basis latere superiore cordato, inferiore subobtuso, ad apicem rotundato-obtusa, retusa, minute apiculata, in costa supra plus minusve pilosula et infra sparse pilosula; costa impressa supra, infra salienti, venulis obscuris. Inflorescentiae 3.5 cm. longae, terminales, axe dense puberulo; bracteis 2.5 mm. longis, 1.5 mm. latis, ovatis, caducis, intus glabris, extus puberulis; pedicello 1–2 mm. longo, dense puberulo; bracteolis 6 mm. longis, 3 mm. latis, ellipticis, acutis, intus villosulis, puberulis extus. Hypanthium 1.5 mm. longum, glabrum. Sepala quinque, 3.5 mm. longa, 1–1.5 mm. lata, lanceolata, acuminata, glabra. Petali lamina 3.5 mm. longa, 4.5 mm. lata, transverse ovalis, unguicilo 7 mm. longo, subauriculato. Filamenta 20 mm. longa, glabra. Stigma capitellatum. Stylus 19.5 mm. longus, ad basim pilosulus. Ovarium 2 mm. longum, 1 mm. latum, ovale, marginibus pilosulis, lateribus glabris, 2-ovulatum, gynophoro 3 mm. longo, pilosulo. Fructus ignotus.

Type Collection: *R. L. Froes 22232*, "high forest on high land, Cach. Macarico, Rio Icana, Rio Negro," Amazonas, Brazil, April 26, 1947 (HOLOTYPE NY, isotypes IAN, U).

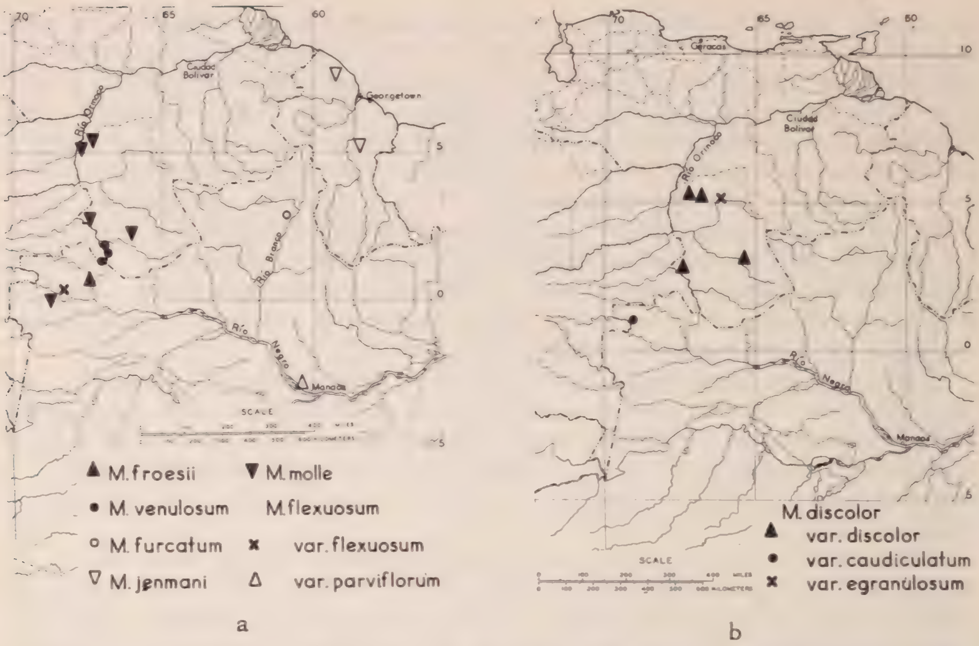

70
65
60
Caudad Bolivar
Georgetown
Rio Orinoco
Rio Branco
Río Negro
Manaos
5
0
SCALE
▲ M. froesii
▼ M. molle
● M. venulosum
M. flexuosum
○ M. furcatum
✖ var. flexuosum
▽ M. jenmani
△ var. parviflorum
a
Caracas
Ciudad Bolivar
Rio Orinoco
Rio Negro
Manaos
10
M. discolor
▲ var. discolor
● var. caudiculatum
✖ var. egranulosum
b

FIG. 5. a. Distribution of *M. froesii, M. venulosum, M. furcatum, M. jenmani, M. molle,* and *M. flexuosum.* b. Distribution of *M. discolor.*

The relationship between this new species and *M. venulosum* is not exceptionally close but is probably the nearest which can be assumed from the available evidence. The two species differ in the shape of the leaflet apices, the length of the pedicels, the pubescence of the bracteoles, and the filament length and pubescence.

10. Macrolobium venulosum Benth. in Mart. Fl. Bras. 15(2): 223. 1870. **Figure 5a.**

Vouapa venulosa (Benth.) Taub. Bot. Centralbl. 47: 394. 1891.
Vuapa venulosa (Benth.) Kuntze, Rev. Gen. 1: 213. 1891.

Tall shrub with puberulous branchlets. *Stipules* 4 mm. long, caducous, subulate, acuminate, puberulous. *Petioles* 2–6.5 mm. long, canaliculate, puberulous. *Leaf blades* oblong or oblong-lanceolate, 13–19-jugate, the pairs of leaflets 3–10 mm. apart. *Leaflets* 6–26 mm. long, 3–7 mm. wide, oblong, the base inequilateral, the upper side more or less obtuse, the lower side acute, the apex truncate-obtuse, retuse to emarginate, glabrous or sparsely puberulous at the base, sometimes generally pilosulose on the lower surface; costa impressed or plane on the upper surface, salient beneath, the venules obscure to prominulous. *Inflorescences* 2.5–4 cm. long, the axis puberulous, peduncles 1.5–5 mm. long; pedicels 2.5–3.5 mm. long, puberulous; bracteoles 7 mm. long, 3.5 mm. wide, elliptic, acute to acuminate, sparsely pilosulose in the apical portion within, puberulous externally, ciliolate. *Hypanthium* 1.5 mm. long, glabrous. *Sepals* four, 3.5–4 mm. long, 1–2 mm. wide, triangular-lanceolate, the adaxial one acute, the others caudate-acuminate, sparsely ciliolate. *Petal* claw about 3.5 mm. long, the complete blade not seen. *Filaments* about 11 mm. long, villosulose near the base. *Stigma* capitellate. *Style* about 8 mm. long. *Ovary* 4 mm. long, 1.5 mm. wide, oblong, finely puberulous on one or both sutures, the lateral surfaces glabrous, the gynophore 2.5 mm. long, minutely puberulous, inserted on base of the hypanthium. *Fruit* (immature to submature) 7–7.5 cm. long, 2.5 cm. wide, oblong, sometimes broader toward the apex, glabrous or with a few marginal hairs, the carpophores 8–13 mm. long, puberulous.

Type Collection: *R. Spruce 3133*, "San Carlos," Río Negro, Amazonas, Venezuela, Oct. 1853 (HOLOTYPE K, isotypes G, GH, NY, P, US-frag., W).

Additional Specimens: COLOMBIA: Río Negro, vicinity Piedra de Cocui, Vaupes, Dec. 1947, *Schultes & Lopez 9530* (US).

There are two sheets bearing the type collection number at Geneva, one of which is a fruiting specimen. The latter may be part of a second Spruce collection, for the leaflets are smaller and pilosulose on the lower surface. Also, it has shorter petioles and rachises. It is certain that Bentham did not study this material because he specifically states in his original description of the species that he had no fruit available for his examination.

This species shows the greatest affinity with *M. flexuosum*, particularly with var. *parviflorum* of that species. It differs from that variety by having smaller leaflets which are usually glabrous, closer to each other, and the ovary is marginally puberulous instead of pilosulose. From *M. froesii*, to which it also bears some relationship, it may be separated by the shape of the leaflet apex, the length of the pedicels, and the pubescence of the bracteoles and filaments.

11. Macrolobium flexuosum Spruce ex Benth. in Mart. Fl. Bras. 15(2): 223. 1870. **Figure 5a.**

Tree 7–10 m. tall, the branchlets puberulous or pilose. *Petioles* 6–9 mm. long, sulcate lightly or canaliculate on the upper surface, pilosulose or puberulous. *Leaf blades* oblong-elliptic or broadly elliptic, 10–16-jugate, the pairs of leaflets 9–20 mm. apart; rachis 11–21.5 cm. long, pilosulose, or sparsely puberulous on the axis and the wing margins. *Leaflets* 11–45 mm. long, 5–15 mm. wide, oblong, the base inequilateral, the upper side obtuse to subcordate, the lower side acute to subobtuse, the apex rotund or truncate, obtusely or acutely emarginate; upper surface lustrous, glabrous except puberulous on the costa, the hairs uncinate or arcuate, beneath pilosulose, sometimes sparingly so, costa more strongly pubescent; costa impressed or subsalient above, salient beneath, the venules numerous, closely parallel, prominent on both surfaces or obscure beneath. *Inflorescences* 3.5–6.5 cm. long, rarely with a lateral branchlet, the axis puberulous, the peduncle 1–2 mm. long; bracts 1.5–3 mm. long, 1.5 mm. wide, early caducous, triangular-ovate, ciliolate, glabrous within, puberulous or short-pilosulose externally; pedicels 2–3.5 mm. long, puberulous; bracteoles 5–6.5 mm. long, 3–3.5 mm. wide, elliptic, cuspidate-acute, appressed-puberulous or short-pilosulose externally, villosulose within. *Hypanthium* 1.5–2 mm. long, glabrous or sparsely pilosulose. *Sepals* five, free or the adaxial pair slightly united at the base, the dorsal pair 2–2.5 mm. long, 1.5 mm. wide, triangular, the others 3–3.5 mm. long, 1.5–3 mm. wide, oblong to oval or lanceolate, ciliolate apically. *Petal* blade 3.5 mm. long, 4 mm. wide, suborbicular, pilosulose up to the center externally, glabrous or villosulose sparsely within, the claw 4–7.5 mm. long, glabrous or pilosulose externally, ciliolate, villosulose within. *Filaments* villosulose basally. *Stigma* simple or capitellate. *Style* pilosulose at the base. *Ovary* 1.5–2 mm. long, 1–1.5 mm. wide, linear-elliptic or oblong, marginally pilosulose or villosulose, laterally pilosulose or glabrous, 2–4-ovulate, the gynophore 1.5–2 mm. long, pilosulose, inserted in the base of the hypanthium. *Fruit* unknown.

Key to the Varieties of *Macrolobium flexuosum*

1. Ovary pubescent throughout; bracts 3 mm. long; bracteoles 6.5 mm. long; hypanthium sparsely pilosulose; leaves 10–11-jugate, rachis pilosulose; leaflets rotund and acutely emarginate at apex. .... 11a. var. *flexuosum*.

1. Ovary pubescent only on margins; bracts and bracteoles shorter; hypanthium glabrous; leaves 10–16-jugate, rachis sparsely puberulous on axis and wing margins; leaflets truncate and obtusely emarginate at apex. .... 11b. var. *parviflorum.*

11a. Macrolobium flexuosum var. flexuosum. Figure 5a.

Vouapa flexuosa (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 393. 1891.
Vuapa flexuosa (Spruce ex Benth.) Kuntze, Rev. Gen. 1: 213. 1891.

Tree with flexuose branches, 5 m. tall, the branchlets pilose. *Leaf blades* oblong-elliptic, 10–11-jugate, the pairs of leaflets 10–16 mm. apart; rachis 11–14 cm. long, pilosulose. *Leaflet* base obtuse on the upper side, acute on the lower side, the apex rotund and acutely emarginate, the costa impressed above, the venules obscure on the under surface. *Inflorescences* 3.5–4.5 cm. long; bracts 3 mm. long, 1.5 mm. wide, puberulous on the outer surface; bracteoles 6.5 mm. long, 3.5 mm. wide, appressed-puberulous on the outer surface. *Hypanthium* 2 mm. long, sparsely pilosulose. *Sepals* with the adaxial pair united at the base. *Petal* blade about 4 mm. in diameter, orbicular, the claw 7–7.5 mm. long. *Filaments* about 15 mm. long. *Ovary* pilose marginally, puberulous on the lateral surfaces, 4-ovulate.

Type Collection: *R. Spruce 2593*, "Falls of Panure," Rio Vaupés, Amazonas, Brazil, Sept. 1852 (HOLOTYPE K, isotypes G, GH, NY, P, W). Known only by the type collection.

11b. Macrolobium flexuosum var. parviflorum (Ducke) Cowan, comb. nov. Figure 5a.

Macrolobium parviflorum Ducke, Bol. Téc. Inst. Agron. Norte [Belém] 2: 11. 1944.

Small tree with puberulous branchlets. *Leaf blades* broadly elliptic, 10–16-jugate, the pairs of leaflets 9–20 mm. apart; rachis 12–21.5 cm. long, sparsely puberulous on the axis and wing margins. *Leaflet* base subcordate on the upper side, subobtuse on the lower side, the apex truncate and obtusely emarginate, the costa subsalient on the upper surface, the venules prominent. *Inflorescences* 3.5–6.5 cm. long; bracts 1.5 mm. long, 1.5 mm. wide, short-pilosulose on the outer surface; bracteoles 5 mm. long, 3 mm. wide, short-pilosulose externally. *Hypanthium* 1.5 mm. long, glabrous. *Sepals* free. *Petal* blade 3.5 mm. diameter, the claw 4 mm. long. *Ovary* pilosulose marginally, the lateral surfaces glabrous, 2-ovulate.

Type Collection: *A. Ducke 1418* (H.J.B.R. 50739), "Cachoeira Grande, Manaôs," Amazonas, Brazil, Oct. 1943 (HOLOTYPE RB, isotypes A, F, IAN, NY, US). Known only by the type collection.

Macrolobium flexuosum appears to be near the terminus of one of the side-lines of relationship which has *M. brevense* at its base. Its closest relatives are *M. venulosum* and *M. furcatum*. It may be separated from the former by the type of pubescence on the ovary, pubescence of the bracteoles, and the number of sepals. From *M. furcatum* it differs by its pubescent inner surface of the bracteoles and by its pubescent filaments. Var. *parviflorum* may be further distinguished from *M. furcatum* by the leaf outline, the length of the leaves and the size and pubescence of the bracts.

The most important differences separating the two varieties of this species are the distribution of the pubescence on the ovary, the shape of the leaflet apices, and the size of the bracts and bracteoles.

It is an unusual circumstance that Ducke failed to relate his *M. parviflorum* to *M. flexuosum*, for he rarely has been at fault in his opinions regarding the relationships of his new species in this genus. The proximity of relationship is unmistakable but the differences are not of specific stature.

12. Macrolobium furcatum Ducke, Bol. Téc. Inst. Agron. Norte [Belém] 2: 12. 1944. Figure 5a.

Tree to 20 m. tall, the branchlets and leaflets glabrous. *Petioles* 8–12 mm. long, canaliculate, glabrous or with a very few scattered hairs. *Leaf blade* oblong, 11–14-jugate, the pairs of leaflets 8–12 mm. apart; rachis 9.5–12 cm. long, glabrous or rarely with few scattered hairs on the upper surface of the wings. *Leaflets* 16–32 mm. long, 6–10 mm. wide, oval-oblong, the base inequilateral, the upper side cordate, the lower obtuse, the apex rotund, slightly retuse, apiculate minutely, the costa impressed on the upper surface, salient beneath, the venules prominulous. *Inflorescence* 4.5–5 cm. long, 1–2 lateral branchlets frequently present, the axis sparsely short-pilosulose, the peduncles 4–6 mm. long, glabrous or very sparsely short-pilosulose; bracts 5 mm. long, 2.5 mm. wide, caducous, ovate, acute, glabrous except for the ciliolate margins; pedicels 3 mm. long, very sparsely short-pilosulose; bracteoles 7 mm. long, 3.5 mm. wide, oblong-obovate, abruptly acute, glabrous except for a few hairs at the apex. *Hypanthium* 2 mm. long, sessile, glabrous. *Sepals* five, the adaxial pair nearly completely united, 4.5–5 mm. long, 1–1.5 mm. wide, linear-oblong. *Petal* blade 4.5 mm. long, 6 mm. wide, transversely oval, the claw 5 mm. long, auriculate, glabrous. *Filaments* 16.5 mm. long, glabrous. *Stigma* capitellate. *Style* over 16.5 mm. long, glabrous. *Ovary* 2.5 mm. long, 1 mm. wide, oval-oblong, 2-ovulate, glabrous, the gynophore about 1.5 mm. long, sparsely pilosulose, inserted midway on the adaxial wall of the hypanthium. *Fruit* unknown.

Type Collection: *A. Ducke 1394* (H.J.B.R. No. 50738), "Bôa Vista, Rio Branco," Amazonas, Brazil, Aug. 1943 (HOLOTYPE RB, isotypes A, F, IAN, NY, US). Known only by the type collection.

The affinity of *M. furcatum* for *M. flexuosum*, and in particular for var. *parviflorum* of the latter species, is quite clear. It differs from *M. flexuosum* by its glabrous bracteoles and filaments, and it may be further distinguished from var. *parviflorum* by the outline and length of the leaf blades and by the size and pubescence of the bracts.

13. Macrolobium molle (Benth.) Cowan, comb. nov. **Figure 5a.**

Macrolobium flexuosum Spruce ex Benth. var. *molle* Benth. in Mart. Fl. Bras. **15**(2): 223. 1870.

Tree 8–18 m. tall, to 38 cm. in diameter, the branchlets densely pilose. *Stipules* 5–19 mm. long, 1–2 mm. wide, caducous, subulate or falcate-linear, acuminate, densely papillose-puberulous on the inner surface, densely pilosulose outside. *Petioles* 7–15 mm. long, sulcate at the apex. *Leaf blades* oblong or oval-oblong, 4–10-jugate, the pairs of leaflets 6–20 mm. apart; rachis (4–)5(–10.5) cm. long, puberulous on the upper surface, pilosulose beneath. *Leaflets* (20–)30(–63) mm. long, (8–)12(–23) mm. wide, oblong, the base inequilateral, the upper side subcordate to cordate, the lower side acute to subobtuse, the apex rotund, entire to retuse, sometimes minutely apiculate; upper surface velvety-puberulous, punctate and densely beneath, the lateral surfaces of the costa more densely pubescent than blade; costa plane to subimpressed on the upper surface, salient beneath, the venules usually obscure, sometimes subprominulous. *Inflorescence* 3–8.5 cm. long, the axis pilosulose, the peduncle 9–23 mm. long; bracts 1.5 mm. long, 0.5 mm. wide, early caducous, triangular, acute, ciliolate, strigulose on the inner surface, pilosulose externally; pedicels 2–4 mm. long, pilosulose; bracteoles 6 mm. long, 3–3.5 mm. wide, elliptic or oval-elliptic, pilosulose. *Hypanthium* 1 mm. long, glabrous, sessile. *Sepals* five, the adaxial pair partly united, 1.5–3 mm. long, 0.5–2 mm. wide, lanceolate, acuminate to caudate-acuminate, ciliolate apically. *Petal* blade 3–4.5 mm. long, 3.5–5 mm. wide, transversely oval, glabrous externally, villose on the inner surface up to and over the center, the claw 2.5–3.5 mm. long, auriculate, ciliolate at the base, more or less villosulose on the inner surface. *Filaments* 10–12.5 mm. long, villosulose near the base. *Stigma* capitellate or only very slightly swollen. *Style* 10–12 mm. long, pilosulose basally. *Ovary* 2–2.5 mm. long, 1–1.5 mm. wide, oval, (1–)2-ovulate, pilosulose marginally, the lateral surfaces glabrous; gynophore 1.5 mm. long, pilosulose, inserted on the base of the hypanthium. *Fruit* 5–7.5 cm. long, 3.5–4.5 cm. wide, oblong to oval, glabrous or the margins sparsely pilosulose, the carpophores 2–7.5 mm. long, sparsely pilosulose. *Seeds* one per fruit, 2–2.5 cm. in diameter, suborbicular, flat, the testa membranous, irregularly venose.

LECTOTYPE: *R. Spruce 2408*, "Falls of São Gabriel, igapo," Rio Uaupés, Brazil, Aug. 1852 (deposited K, isolectotypes F-frag., G, GH, NY, P, US, W).

Additional Specimens: BRAZIL: Ad flum. Casiquiari, Vasiva et Pacimoni, Jan. 1854, *Spruce 3330* (K, NY, P, W). VENEZUELA: Amazonas: Puerto Ayacucho, May 1940, *Williams 13050* (F, US, VEN); Maroa, Río Guainia, Feb. 1942, *Williams 14251* (F, US, VEN); Caño S. Miguel, Guainia, alto Río Negro, March 1942, *Williams 14880* (F, US, VEN); Río Sanariapo, above Raudal Maipures, July 1942, *Williams 15976* (F, MO-frag., NY, US, VEN).

Vernacular Names: Venezuela: "ahuiapa" (Baniba); "arepillo"; "arepito"; "guape" (Quariqueno); "macuca" (Baniba).

It was assumed by Bentham that the differences separating this taxon from typical *M. flexuosum* were the greater density of pubescence on the leaflets and its longer inflorescences and he considered it only as a variety. However, there are additional differences which, with the ones he recognized, are adequate for the recognition of it as a distinct species. *M. molle* is generally puberulous over the upper leaflet surface, puberulous only on the costa in *M. flexuosum;* the rachis of *M. molle* is shorter and bears fewer pairs of leaflets than that of *M. flexuosum*; the peduncle of *M. molle* is 9–23 mm. long, in contrast to the 1–2 mm. one of its relative; the typical variety of *M. flexuosum* has completely pubescent ovaries which are 4-ovulate, whereas in *M. molle* the lateral surfaces are glabrous and the ovary is 1–2-ovulate, as in var. *parviflorum*.

The systematic position of this species is much nearer *M. multijugum* than to *M. flexuosum*; this alliance is most obvious in the relatively elongate peduncles of both. *M. molle* differs from its nearest relative in having pilose branchlets, as compared to glabrous, much longer petioles, and pubescent leaflets.

14. **Macrolobium jenmanii** (Gleason) Sandwith, Lloydia 2: 185. 1939. **Figure 5a.**

Vouapa jenmani Gleason, Bull. Torrey Club 54: 609. 1927.

Tree 3 m. tall, the branchlets puberulous, glabrescent. *Petioles* 8–15 mm. long, subalate-canaliculate, pilosulose on the upper surface, glabrescent. *Leaf blades* 4–6-jugate, the pairs of leaflets 12–23 mm. apart, the rachis 5–10 cm. long, pilosulose on the upper surface, glabrescent, glabrous beneath. *Leaflets* 3.5–10 cm. long, 1–2.5 cm. wide, glabrous, oblong-lanceolate or lanceolate, the base inequilateral, obtuse, the apex acute, mucronate; costa slightly impressed above, strongly salient beneath, the venules prominulous. *Inflorescences* 5.5–8 cm. long, the axis puberulous, the peduncle 2–3 mm. long; bracts 7 mm. long, 3 mm. wide, caducous, ovate-lanceolate, ciliolate, glabrous within, puberulous externally; pedicels 2.5–3.5 mm. long, puberulous; bracteoles 8 mm. long, 3.5 mm. wide, oblong-oblanceolate, sparsely villosulose within, puberulous externally, cuspidate. *Hypanthium* 1.5 mm. long, glabrous. *Sepals* five, the adaxial pair partly united, 4–5 mm. long, 1–1.5 mm. wide, linear, glabrous. *Petal* blade 5 mm. long, 7.5 mm. wide, transversely oval, within villosulose in the throat, glabrous externally, the claw 5–8 mm. long, auriculate, glabrous externally, sparsely villosulose within. *Filaments* about 22 mm. long, sparsely villosulose in the lower part. *Stigma* capitellate. *Style* about 20 mm. long, with few basal hairs. *Ovary* 3 mm. long, 1.5 mm. wide, oblong-oblanceolate, 2-ovulate, pilosulose on the margins, glabrous on the lateral surfaces; gynophore 2 mm. long, puberulous, inserted near the apex of the adaxial wall of the hypanthium. *Fruit* 12.5–15.5 cm. long, 7.5–9 cm. wide, broadly oblong, the adaxial margin subalate, glabrous, the carpophores 3–10 mm. long, glabrous. *Seeds* 5 cm. long, 3.5 cm. wide, inequilaterally ovate, the testa sordid-brown with reticulate black lines.

Type Collection: *G. S. Jenman 4076*, "upper Demerara R.," British Guiana, Sept. 1887 (HOLOTYPE NY).

Additional Specimens: BRITISH GUIANA: Waramuri Mission, Moruka R., Pomeroon Dist., Oct. 1922, *de la Cruz 2534* (F, GH, MO, NY, UC, US).

Although *M. jenmanii* is probably properly situated in an advanced position in the multijugate line of relationship, its exact kinship is difficult to determine. It is not at all closely related to any of the species in this association but more than likely represents a short, divergent line from the main line of relationship which has ended blindly. It is easily distinguished by the shape and size of its leaflets and especially by the dimensions of its legumes. The immensity of the latter is rivaled only by the size of those of *M. brevense* but the two species are very different otherwise.

15. **Macrolobium discolor** Benth. in Mart. Fl. Bras. 15(2): 222. 1870. **Figure 5b.**

Shrub or tree 2–5 m. tall, the branchlets pilosulose, or pilosulose and puberulous. *Stipules* 5–6 mm. long, 0.5–1 mm. wide, subulate, acute to acuminate, early caducous. *Petioles* 2–10 mm. long, shallowly canaliculate, pilosulose or pilosulose and puberulous. *Leaf blades* 3–7-jugate, the pairs of leaflets 8–32 mm. apart; rachis 2.5–10 cm. long, canaliculate to slightly sulcate on the upper surface, pilosulose or pilosulose and puberulous. *Leaflets* 1.5–7 cm. long, 0.5–3.5 cm. wide, oblong, oblong-oval, or oblong-obovate, the base inequilateral, the upper side subobtuse, obtuse, or cordate, the lower side subobtuse to obtuse, the apex rotund, slightly retuse to emarginate, minutely apiculate; lustrous above, glabrous except uncinate-puberulous on the costa, the lower surface pallid, glaucous, granulose-ceriferous or not, glabrous, or the costa puberulous or sparingly pilosulose; costa plane or impressed on the upper surface, salient beneath, the venules prominent. *Inflorescences* 3–13.5 cm. long, terminal or axillary, the axis puberulous or pilosulose and puberulous, the peduncle 2–6 mm. long; bracts 2.5–5 mm. long, 1.5–2 mm. wide, lanceolate, triangular-lanceolate, or oblong-oval, ciliolate, puberulous externally or only on the costa, glabrous within; pedicels 1–5 mm. long, puberulous or pilosulose and puberulous; bracteoles 5.5–12 mm. long, 3.5–6 mm. wide, elliptic or oval broadly, acuminate or caudate-acuminate, puberulous on the outer surface, glabrous, sparsely puberulous, or strigulose within. *Hypanthium* 1–2 mm. long, glabrous or more or less puberulous. *Sepals* five, free or the adaxial pair somewhat united, sometimes dimorphic, lanceolate or oblong, acute to long-acuminate, glabrous or more or less ciliolate. *Petal* blade 3.5–7 mm. long, 5–6 mm. wide, transversely oval to suborbicular, glabrous, the claw 4–12.5 mm. long, villosulose basally on the outer surface, glabrous or sparsely villosulose on the inner surface, ciliolate basally. *Filaments* 20–25 mm. long, sparsely villosulose basally. *Stigma* capitate to capitellate. *Style* 19–23 mm. long, lower part pilosulose. *Ovary* 1.5–3 mm. long, 1–1.5 mm. wide, linear to oblong, on the margins short-pilosulose, pilosulose, or villose, the lateral surfaces glabrous, 2–6-ovulate; gynophore 2–3 mm. long, pilosulose or puberulous, inserted at any point between the base and the margin of the adaxial hypanthial wall. *Fruit* (immature) 6–8.5 cm. long, 2–2.5 cm. wide, subfalcate-oblong, sparsely pilosulose on the margins, the carpophores 4–5 mm. long, pilosulose. *Seeds* 1.5 cm. in diameter, orbicular, the testa brown, very thinly membranous.

Key to the Varieties of *Macrolobium discolor*

1. Leaflets microscopically granulose-ceriferous on lower surface, margins narrowly involute; bracts 4.5–5 mm. long; bracteoles 8.5–12 mm. long; ovary pilosulose marginally. .... 2.
1. Leaflets pallid beneath but not granulose-ceriferous, margins plane; bracts 2.5 mm. long; bracteoles 5.5–6.5 mm. long; ovary villose marginally. .. 15c. var. *egranulosum.*
2. Undersurface of leaflets glabrous or sometimes with very few hairs on costa base; sepals dimorphic, adaxial pair 2.5–3 mm. long. .... 15b. var. *discolor.*
2. Undersurface of leaflets sparingly pilosulose; sepals homomorphic, adaxial pair 4–4.5 mm. long. .... 15a. var. *caudiculatum.*

15a. Macrolobium discolor var. caudiculatum (Ducke) Cowan, **comb. nov. Figure 5b.**

Macrolobium caudiculatum Ducke, Trop. Woods 65: 28. 1941.

Small tree, the branchlets pilosulose and puberulous. *Stipules* 5 mm. long, 1 mm. wide, lanceolate, acute, short-pilosulose externally, glabrous within. *Petioles* 4–5 mm. long, both the petioles and the rachis pilosulose and puberulous. *Leaf blades* 4–6-jugate, the pairs 20–25 mm. apart. *Leaflets* 3–5 cm. long, 1.5–2.5 cm. wide, the base subobtuse, the apex slightly retuse, the lower surface sparingly pilosulose. *Inflorescence* 5.5 cm. long, the axis pilosulose and puberulous, terminal or axillary; bracts 5 mm. long, triangular-lanceolate, the outer surface puberulous; pedicels 2–2.5 mm. long; bracteoles broadly oval, 9.5 mm. long, 4.5 mm. wide, puberulous externally, sparingly strigulose within. *Sepals* 4–5.5 mm. long, lanceolate or oblong, sparsely ciliolate. *Petal* not seen. *Filaments* villosulose in the lower part. *Ovary* short-pilosulose on the margins, the gynophore 3 mm. long, puberulous, inserted at the base of the hypanthium. *Fruit* unknown.

Type Collection: *A. Ducke (H.J.B.R. No.) 24064*, "baixo Uaupés," Amazonas, Brazil, Nov. 1932 (HOLOTYPE RB). Known only by the type collection.

15b. Macrolobium discolor var. discolor. Figure 5b.

Vouapa discolor (Benth.) Taub. Bot. Centralbl. 47: 393. 1891.
Vuapa discolor (Benth.) Kuntze, Rev. Gen. 1: 213. 1891.

Branchlets pilosulose. *Petioles* (2–)5–10 mm. long, pilosulose. *Leaf blades* (3–)4–5(–7)-jugate, the pairs 10–30 mm. apart, the rachis pilosulose. *Leaflets* (1.5–)4–5(–7) cm. long, 1–3.5 cm. wide, the apex retuse, the lower surface granulose-ceriferous, glabrous or rarely puberulous on costa base, the costa impressed above. *Inflorescence* (3–)6(–13.5) cm. long, terminal, the axis puberulous; bracts 4 mm. long, 1.5 mm. wide, lanceolate, puberulous externally on the costa and at the apex, sparsely puberulous within; pedicels 2–5 mm. long, puberulous; bracteoles 8.5–12 mm. long, 3.5–6 mm. wide, more or less elliptic, glabrous within. *Sepals* free or united basally, lanceolate, acute to long-acuminate, the adaxial pair 2.5–3 mm. long, 1–1.5 mm. wide, the others 5–7 mm. long, 1–3 mm. wide. *Petal* blade (3.5–)5.5–7 mm. long, the claw (6.5–)9–12.5 mm. long. *Ovary* pilosulose on the margins, 4–6-ovulate, the gynophore pilosulose, inserted on the adaxial hypanthial wall at or near the apex. *Fruit* unknown.

Type Collection: *R. Spruce 3755*, "In sylvis humilioribus secus fl. Guainiam," upper Río Negro, Venezuela, Nov. 1854 (HOLOTYPE K).

Additional Specimens: VENEZUELA: Amazonas: Cerro Sipapo, near base camp, above Caño Cuao, Dec. 1948, *Maguire & Politi 27978* (GH, IAN, NY, P, RB, U); savanna near Base Camp, Cerro Sipapo, Feb. 1949, *Maguire & Politi 28819* (G, NY, US, VEN), *28823* (F, G, IAN, K, MO, NY, US, VEN); Esmeralda Savanna, Alto Orinoco, Sept. 1944, *Steyermark 58402* (F, VEN); Esmeralda, Grand Savanna-Sect. 1, Nov. 1928, *Tate 289* (NY, US).

15c. Macrolobium discolor var. egranulosum Cowan, **var. nov. Figure 5b.**

Arbuscula 2–3 m. alta, ramulis pilosulis. Stipulae 5 mm. longae, subulatae vel subulato-lanceolatae, intus glabrae, extus pilosulae. Petiolus 2–5 mm. longus, pilosulus. Foliorum lamina 3-5-jugata, paribus 8-21 mm. separatis; rachibus 2.5-4.5 cm. longis, angustissime alatis, pilosulis. Foliola 1.5-4 cm. longa, 0.5-2.5 cm. lata, oblonga vel oblongo-ovalia, in costa supra puberula, infra sparsissime pilosula vel glabra, margine plana; costa plana vel leviter saliens supra, infra valde saliens, venulae prominentes. Inflorescentiae 3-10 cm. longae, axe puberulo; bracteolae 5.5-6.5 mm. longae, 3.5-4 mm. latae, ovales, glabrae intus, extus puberulae. Hypanthium 1-1.5 mm. longum, puberulum. Sepala adaxilia 2 mm. longa, 1 mm. lata vel nulla, sepala cetera 2-3.5 mm. longa, 1-1.5 mm. lata, glabra vel ad apicem ciliolata. Petali lamina 4.5 mm. longa, 5-6 mm. lata, plus minusve transverse ovalis. Filamenta 18-20.5 mm. longa, sparse villosula ad basim. Stigma subcapitellatum. Stylus 15.5-20 mm. longus, ad basim sparsissime pilosulus. Ovarium 1.5-2 mm. longum, 1 mm. latum, oblongum, marginibus villosis, 2-4-ovulatum, gynophoro 1.5-2 mm. longo, villosulo. Fructus 5 cm. longus, 2.5 cm. latus, oblongus, marginibus sparse pilosulis; semina 1.5 cm. diametro, suborbicularia, testa tenuissime membranacea.

Type Collection: *B. Maguire, R. Cowan & J. Wurdack 30842*, "frequent shrub to 2 m. tall, petal white, filaments red, calyx red, dry open eastern slopes of Cerro Moriche, Río Ventuari, Amazonas, Venezuela," Jan. 1951 (HOLOTYPE NY, isotypes F, G, GH, IAN, K, MO, P, RB, U, UC, US, VEN).

Additional Specimens: VENEZUELA: Sabanita, northwest base of Cerro Moriche, Jan. 1951, *Maguire, Cowan & Wurdack 30977* (BM, COL, NY).

The affinity of this species for *M. multijugum* is unmistakable but *M. discolor* differs by its short peduncles, somewhat differently-shaped epunctate leaflets and the very different shape of the fruit.

The typical variety and var. *caudiculatum* are characterized by the presence of great quantities of granular wax-bodies which are of uniform size and form and are distributed evenly over the lower surface of the leaflets. Although this condition is not peculiar to these taxa, it does serve to distinguish them from the other variety.

Var. *caudiculatum* may be distinguished from the typical variety by its pubescent under surfaces of the leaflets and the more uniform size of the sepals. It is, then, not strikingly distinct and certainly not worthy of the specific rank accorded it by Ducke.

Var. *egranulosum* differs, in addition to the difference noted above, by its smaller bracts and bracteoles, by the villose ovary margins, and by its plane leaflet margin. While the other two varieties are obviously quite closely related, this one is not clearly related to either of the others.

16. **Macrolobium multijugum** (DC.) Benth. in Mart. Fl. Bras. 15(2): 222. 1870. **Figure** 6.

Small to large tree 3-37 m. tall, 2.5-10 dm. diameter, the branchlets glabrous, very rarely minutely puberulous. *Petioles* 1-3.5 cm. long, canaliculate to sulcate, glabrous or very rarely minutely puberulous. *Leaf blades* 3-9-jugate, the pairs 7-28 mm. apart; rachis 3-14.5 cm. long, canaliculate, glabrous or very rarely minutely puberulous. *Leaflets* 2.5-9.5 cm. long, 1-4.5 cm. wide, oblong-oblanceolate, oblong, oblong-obovate, or narrowly oblong, the base inequilateral, the upper side subcordate to cordate or acute, the lower side acute, the apex usually truncate, sometimes rotund, entire, or broadly retuse to emarginate, minutely apiculate, the margin entire or sinuate, glabrous, or more often pilosulose on the apical-lateral surface of the costa at the junction with the upper side of the leaflet base, punctate beneath; costa impressed above, infrequently plane, strongly salient beneath, the venules prominulous. *Inflorescence* 2.5-14 cm. long, the axis glabrous or puberulous, the peduncles 10–55 mm. long; bracts 1–2.5 mm. long, 1–1.5 mm. wide, early caducous, triangular, acute, ciliolate but otherwise glabrous, rarely puberulous externally; pedicels 2–5.5 mm. long, glabrous or puberulous; bracteoles 5–8 mm. long, 3–5 mm. wide, elliptic to oblong or ovate-lanceolate, acute, usually glabrous, infrequently ciliolate or apically puberulous, very rarely puberulous internally. *Hypanthium* 1–2 mm. long, glabrous, sessile. *Sepals* five, free or the adaxial pair more or less united, 2.5–6 mm. long, 0.5–2 mm. wide, oblong or linear to lanceolate, usually acuminate or caudate-acuminate, sometimes acute, glabrous or sparsely ciliolate apically. *Petal* blade 3–7 mm. long, 3.5–8.5 mm. wide, transversely oval, the claw 3.5–6.5 mm. long, auriculate, glabrous or sparingly pilosulose at the base externally, more or less villosulose within, the auricles sometimes ciliolate. *Filaments* 11–21 mm. long, somewhat villosulose basally. *Stigma* simple or capitellate. *Style* 13.0–22.5 mm. long, glabrous or rarely puberulous basally. *Ovary* 1.5–3.5 mm. long, 1–2.5 mm. wide, usually oval, less frequently oblong, oval-oblong or suborbicular, 1(–2)-ovulate, glabrous or infrequently puberulous to pilosulose on the margins; gynophore 2–3.5 mm. long, glabrous or infrequently puberulous to pilosulose, inserted on the hypanthium base. *Fruit* 3–7.5 cm. long, 3–5.5 cm. wide, oval to suborbicular, the adaxial margin contracted into a narrow wing-like ridge, glabrous, the carpophores 2–7 mm. long, glabrous or puberulous. *Seeds* 2 cm. long, 1.5–2.5 cm. wide, oval to suborbicular, the testa thin-crustose, brown, venose.

Key to the Varieties of *Macrolobium multijugum*

1. Leaflets entire, usually broadly oblong to oblong-obovate. ...... 16a. var. *multijugum.*
1. Leaflets sinuate, narrowly oblong. .... 16b. var. *sinuatum.*

16a. Macrolobium multijugum var. multijugum. Figure 6.

Outea multijuga DC. Prodr. 2: 510. 1825.
Vouapa multijuga (DC.) Taub. Bot. Centralbl. 47: 393. 1891.
Vuapa multijuga (DC.) Kuntze, Rev. Gen. 1: 213. 1891.

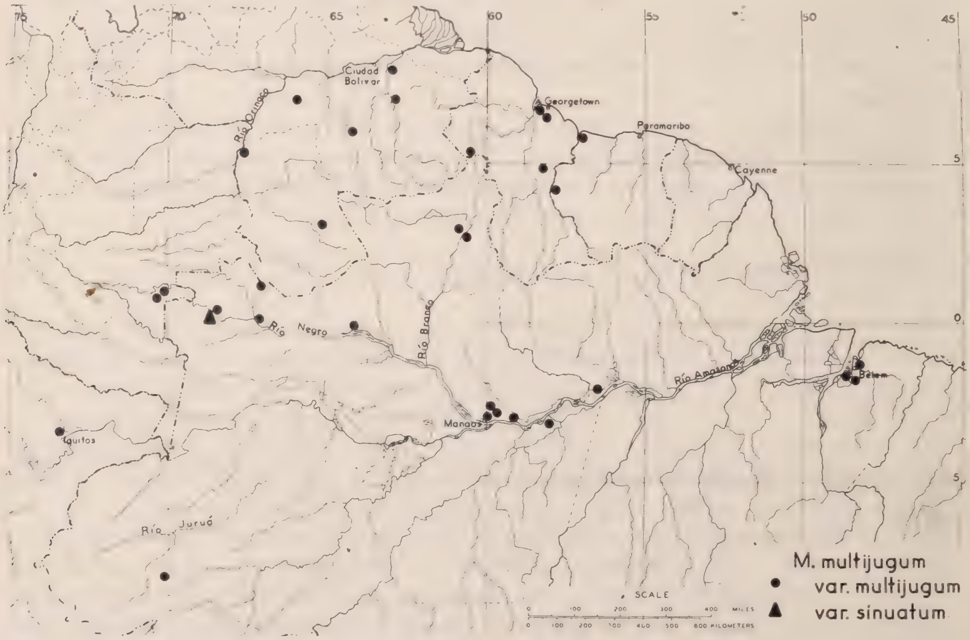

75
70
65
60
55
50
45
5
0
5
Ciudad Bolivar
Georgetown
Paramaribo
Cayenne
Río Orinoco
Río Negro
Río Branco
Río Amazonas
Belém
Manaus
Iquitos
Río Juruá
SCALE
0 100 200 300 400 MILES
0 100 200 300 400 500 600 KILOMETERS
M. multijugum
● var. multijugum
▲ var. sinuatum

FIG. 6. Geographic distribution of *M. multijugum.*

Leaves about 6-jugate, the pairs usually about 18 mm. apart. *Leaflets* averaging 6–7 cm. long, 2–3 cm. wide, oblong, oblong-oblanceolate, or oblong-obovate, the margin entire. *Inflorescence* usually about 4–8 cm. long, the peduncle averaging 15–25 mm. long; pedicels about 4 mm. long; bracteoles about 6 mm. long, 4 mm. wide, elliptic to oblong. *Sepals* most often 4 mm. long, 1 mm. wide. *Petal* blade generally 4–5 mm. long, 5–6 mm. wide, the claw about 5 mm. long. *Filaments* about 16 mm. long.

Type Collection: *J. Martin s.n.*, "Cayenne" (HOLOTYPE G, isotypes K, P, VEN-frag.). A letter from Dr. Hochreutiner, then at Geneva, to Dr. Pittier, who was at the National Herbarium of Venezuela, was found attached to one of the specimens of this species from the latter institution. In it Dr. Hochreutiner explained that the holotype of this species is a sterile branch and enclosed a photograph and two leaflets of it. The isotype from the Kew Herbarium is fruiting, the Paris isotype is flowering and both are certainly just as valuable as the holotype, although the species is recognizable from most of the other species even vegetatively.

Additional Specimens: BRAZIL: Rio de Janeiro, *Glaziou 13759* (P). Pará: Pará, Sept. 1947, *Black 47-1751* (IAN, NY, U); Lago de Faro, July 1903, *Ducke 3727* (G); Lago de Faro, Aug. 1907, *Ducke 8339* (G); Lago de Faro, May 1911, *Ducke 11694* (G); Rio Tapajóz, near Bobure Falls, July 1923, *Ducke 16944* (U); Belém, May 1896, *Huber 122* (G, US); Thomé Assú, Rio Acará, Dist. Acará, Aug. 1931, *Mexia 6027* (F, G, GH, MO, NY, U, UC, US); Belém, June 1951, *Pires 3300* (IAN, NY); Rio Pará, May 1832, *Poeppig 2998* (F, G, P, US); Rio Tapajóz, Santarém, *Spruce 638* (P); Santarém, June 1850, *Spruce 935* (P); vic. Santarém, June 1850, *Spruce s.n.* (G, NY, W). Amazonas: Igarapé do Cachoeira Grande, Manáos, Aug. 1940, *Ducke 347* and *347a* (Y); Barba, Rio Madeira, April 1937, *Ducke 478* (A, F, MO, NY, US); Igarapé do Cachoeira Grande, Manáos, Jan. 1941, *Ducke 576* (F, IAN, MO, NY, US); Cucuhy, ad Rio Negro, Sept. 1935, *Ducke 35189* (G, RB, U, US); Rio Negro, Padauíry, Uacuacu, Oct. 1947, *Froes 22490* (IAN, NY, U); Rio Padauiri, Igarapé Castanha, Oct. 1947, *Froes 22558* (IAN, NY); Rio Urubú, Sept. 1949, *Froes 25224* (IAN, RB), *25278* (IAN, NY); Rio Urubú, São Francisco, Oct. 1949, *Froes 25490, 25507* (IAN, NY); near mouth of Rio Embira, tributary of Rio Tarauca, July 1933, *Krukoff 5186* (A, F, G, MO, NY, U, UC, US); Bôa Vista, Rio Branco, Sept. 1913, *Kuhlman 3236* (U, US); Maues, Nov. 1946, *Pires 43* (IAN, NY); prope San Gabriel do Cachoeira ad Rio Negro, Jan.–Aug. 1852, *Spruce 2258* (G, GH, P); prope Panure ad Rio Uaupés, Oct.–Jan. 1852–53, *Spruce 2439* (G, GH, P, W); igapo near Rio Tarumá, Rio Negro, July 1874, *Traill 183* (P); bei Bôa Vista, Rio Branco, Oct. 1908, *Ule 7581* (G, UC, US); Rio Branco, near Bôa Vista, Oct. 1908, *Ule 7612* (G); Cachoeira Grande bei Manáos, July 1910, *Ule 8866* (G, UC).

PERU: Iquitos on shore of Itaya, July 1924, *Tessmann 3677* (G, NY).

COLOMBIA: Vaupes, Río Cuduyari, Aug. 1944, *Allen 3300* (US); Mita, Río Vaupés, Sept. 1939, *Arbelaez & Cuatrecasas 6746* (COL, F, US).

VENEZUELA: Río Orinoco, *Bonpland 1028* (P). Amazonas: Esmeralda, alto Orinoco, May 1942, *Williams 15462* (F, NY, US, VEN); Cataniapo, Raudal de Atures, May 1942, *Williams 15898* (US, VEN). Bolivar: Río Tonoro, alto Río Paragua, Aug. 1943, *Cardona 817* (NY, US, VEN); Río Paragua, Dec. 1951, *Maguire 32713* (F, G, K, MO, NY, US, VEN); Sabana de Monte Oscuro, Bajo Coura, May 1939, *Williams 12057* (F, VEN); La Paragua, March 1940, *Williams 12594* (F, UC, US, VEN); El Tigre, cerca del Río Cuchivero, June 1940, *Williams 13309* (F, UC, US, VEN).

BRITISH GUIANA: Berbice, right bank of Berbice R., opposite to Yawakuri R., June 1919, *Hohenkerk (F.D.No.)* 798 (BGF); Lama Creek, April 1887, *Jenman 3695* (BM, NY); Lama Creek, May 1896, *Joseph s. n.* (NY); Roraima 1842–43, *Schomburgk 460 & 461* (P, W); Río Branco, Sept. 1842, *Schomburgk* 736 (P, W); Río Branco, *Schomburgk* 797 (F, G, GH, P, US, W); *Schomburgk* 894 (W).

SURINAM: Boven Nickerie, Feb. 1915, *Gonggrypp & Stahel (For. Bur. No.) 1085* (U); Corantyne R., Kaboerie Creek, June 1916, *Herb. Surinam 2217* (IAN, U, US); Maratoka, Nov. 1917, *Herb. Surinam 3423* (U); Surinam, *Hostmann* 76 (F, NY, P, W); Surinam, *Hostmann 686a* (MO, P, U, W); Surinam 1842, *Hostmann & Kappler* 664 (F, G, MO, P, US, W); Para R., March 1838, *Splitgerber s. n.* (W); Akwansa-Nickerie, Sept. 1916, *Stahel & Gonggrypp 3594* (U); *Wullschlagel* 959 (W).

FRENCH GUIANA: *Martin* 7 (P); *Poiteau s. n.* (P); Acarouany, 1858, *Sagot 184* (P, W); Maroni, on sea coast, June 1857, *Sagot 1062* (P, W); Acarouany, May 1855, Sagot s. n. (P).

Vernacular Names: Venezuela: "arepillo", "arepito"; Brazil: "arapari", "arapary-rana", "paricazeiro"; Surinam: "aratapari" (Kar.).

16b. Macrolobium multijugum var. sinuatum Cowan, var. nov. **Figure** 6.

Petiolus 2–3.5 cm. longus, canaliculatus, glaber. Foliorum lamina 5–6-jugata, paribus 1.5–2.5 cm. separatis; rachibus 7–8 cm. longis, glabris. Foliola 4.5–8.5 cm. longa, 1–2.5 cm. lata, anguste oblonga, margine sinuato, ad basim inaequalia sed ambobus lateribus acutis, ad apicem obtusa, apiculata, glabra. Inflorescentiae 5–9 cm. longae, axe glabro, pedunculo 1–3 cm. longo; pedicellis 2–4.5 mm. longis, glabris; bracteolo 7 mm. longo, 4 mm. lato, ovato-lanceolato, glabro. Sepala 3–4 mm. longa, 0.5–1.5 mm. lata, lanceolata, glabra. Filamenta 15 mm. longa. Stigma paulo incrassatum. Ovarium 2–2.5 mm. longum, 1.5–2 mm. latum, ovale vel ovatum, glabrum. Fructus ignotus.

Type Collection: *R. Spruce 2440*, "prope Panure ad Rio Uaupés," Brazil, Oct.–Jan. 1852–53 (HOLOTYPE GH, isotypes BM, G, K, NY, P, W).

On one of the isotypes at Kew, Spruce notes, "..... the lvs being rendered narrower & their margins wavy by the puncture of insects in the bud." However, I have failed to find any suggestion of damage to any part of the specimens examined and I believe that these differences are natural, not due to insect injury as Spruce supposed.

This species is so variable in most of its characters that it is very difficult to enumerate a number of characters which will infallibly separate it from other related species. However, the punctation of the lower leaflet surface and the elongate peduncles of this species are characteristics which reliably distinguish it.

Macrolobium multijugum is rather closely related to *M. molle* and to *M. discolor*. It may be separated from the first of these by its glabrous or nearly glabrous leaflets and glabrous or minutely puberulous inflorescence axis. From *M. discolor* it is distinct by its glandular punctations on the lower leaflet surfaces, its elongate peduncles, and its very different fruit shape.

The two varieties involved differ only by the shape and margin of their leaflets. Whereas the margins of the broadly oblong to oblong-obovate leaflets of the typical variety are entire, the margins of the narrowly oblong ones of the other variety are distinctly sinuate.

17. Macrolobium microcalyx Ducke, Bull. Mus. Hist. Nat. Paris II. 4: 729. 1932. Figure 7.

Shrub of 2 m. to tree 10 m. tall, the branchlets microscopically puberulous or occasionally glabrous. *Petioles* 2–6 mm. long, glabrous or puberulous on the upper surface, canaliculate. *Leaf blades* 3–5-jugate, the pairs 8–25 mm. apart; rachis 3–9 cm. long, glabrous or the axis minutely uncinate-puberulous on the upper surface. *Leaflets* 15–45 mm. long, 7–25 mm. wide, oval to oblong to oblong-obovate, the base inequilateral, the upper side cordate, the lower side acute to subobtuse, the apex rotund, retuse to emarginate, sometimes apiculate; upper surfaces minutely uncinate- or arcuate-puberulous on the costa, glabrous beneath; costa salient above, plane to subsalient beneath, the venules prominulous. *Inflorescence* 2–9 cm. long, the axis minutely puberulous, the peduncle 2–6 mm. long; bracts 1.5–2 mm. long, 1–1.5 mm. wide, caducous, triangular to triangular-ovate, acute, ciliolate, glabrous within, very minutely puberulous externally or rarely glabrous outside; pedicels 1–3.5 mm. long, very minutely puberulous; bracteoles 4.5–7 mm. long, 2–3 mm. wide, oblong to oblong-oval to oblong-obovate, villosulose within, appressed-puberulous externally. *Hypanthium* 1–1.5 mm. long, sparsely puberulous, sessile. *Sepals* five, free, the adaxial ones 0.5–1.5 mm. long, 0.5–1 mm. wide, triangular, acute to acuminate, glabrous, the other sepals 1.5–3 mm. long, 1–1.5 mm.

wide, triangular-lanceolate to lanceolate, acuminate to caudate-acuminate, glabrous. *Petal* blade 2.5–5.5(–7) mm. long, 4–5 mm. wide, transversely oval, the claw 2–4 mm. long, auriculate or merely expanded at the base, more or less pilosulose on the outer surface or rarely glabrous, villosulose within, sometimes sparsely so, claw ciliolate. *Filaments* (10–)16–18 mm. long, villosulose in the lower part. *Stigma* capitellate. *Style* (8.5–)11–16.5 mm. long, villose basally. *Ovary* 1.5–2 mm. long, 1 mm. wide, oblong, 2-ovulate, villose on all surfaces, the gynophore 1.5–2.5 mm. long, villosulose, inserted on the base or up to midway on the adaxial hypanthial wall. *Fruit* unknown.

LECTOTYPE: *A. Ducke (H.J.B.R. No.) 23298*, "Estrada do Aleixo, Manáos," Amazonas, Brazil, Sept. 1929 (deposited RB, isolectotypes G, P, U, US).

Additional Specimens: BRAZIL: Amazonas: Camanaos, Sept. 1935, *Ducke 34* (A, F, IAN, MO, NY, US); Camanaos, upper Rio Negro, Nov. 1929, *Ducke (H.J.B.R. No.) 23299* (US).

PERU: Mishuyacu, near Iquitos, Dept. Loreto, 1929–30, *Klug 140, 387, 1043* (NY, US).

The nearest relative of *M. microcalyx* is *M. montanum*, especially the typical variety of the latter. The following characters of *M. microcalyx* serve to distinguish it from its nearest relative: (1) its sepals are strongly dimorphic in both size and shape; (2) the ovary is villose on all surfaces; and (3) it usually has more pairs of leaflets per leaf.

18. Macrolobium montanum Ducke, Arch. Bot. Jard. Rio de Janeiro 4: 49. 1925. **Figure 7.**

Small shrub 1–1.5 m. tall or small tree 10–13 m. tall, the branchlets glabrous, or minutely puberulous but then glabrescent. *Petioles* 7–13 mm. long, glabrous. *Leaf blades* 2–3-jugate, the pairs 7–17 mm. apart; rachis 8–32 mm. long, glabrous. *Leaflets* 17–32 mm. long, 10–25 mm. wide, oval to suborbicular or oblong to obovate, the base inequilateral, the upper side cordate, the lower rotund-obtuse or acute, the apex rotund, retuse to emarginate; glabrous, or very sparsely puberu-

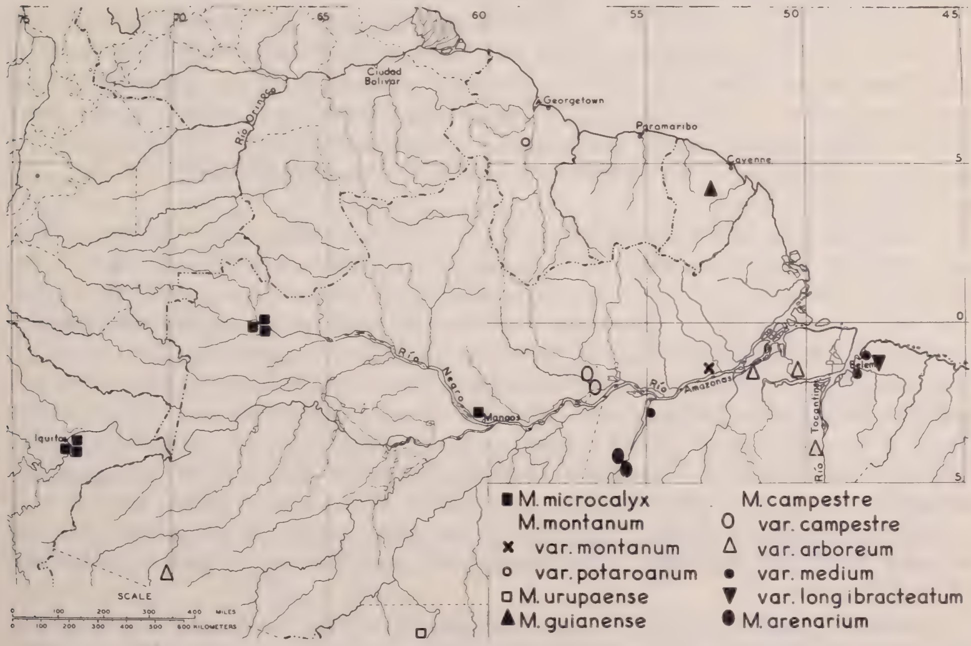

75
70
65
60
55
50
45
Ciudad Bolivar
Georgetown
Paramaribo
Cayenne
Rio Orinoco
5
0
5
Rio Negro
Manaos
Rio Amazonas
Belém
Rio Tocantins
Iquitos
SCALE
0 100 200 300 400 MILES
0 100 200 300 400 500 600 KILOMETERS
■ M. microcalyx
M. montanum
× var. montanum
o var. potaroanum
□ M. urupaense
▲ M. guianense
M. campestre
O var. campestre
Δ var. arboreum
• var. medium
▼ var. longibracteatum
● M. arenarium

FIG. 7. Geographic distribution of *M. microcalyx, M. montanum, M. urupaense, M. guianense, M. campestre*, and *M. arenarium*.

lous on the costa above; costa salient, plane or slightly impressed on the upper surface, salient beneath, the venules obscure on the upper surface, prominulous beneath. *Inflorescence* 4–9 cm. long, the axis minutely puberulous, the peduncle 1.5–9 mm. long; bracts 1–1.5 mm. long, 1–1.5 mm. wide, triangular, glabrous within, glabrous or pilosulose externally; pedicels 4–7 mm. long, minutely puberulous or glabrous; bracteoles 5.5–8 mm. long, 3–3.5 mm. wide, elliptic, pilosulose within, minutely puberulous or glabrous outside. *Hypanthium* 1.5–2 mm. long, glabrous, subsessile. *Sepals* five, 2.5–3.5 mm. long, 1–1.5 mm. wide, the adaxial pair nearly completely united, triangular-lanceolate, acute, the other sepals oblong-lanceolate, lanceolate or elliptic, bluntly acute to acuminate, ciliolate apically. *Petal* blade 3–4 mm. long, 4–5 mm. wide, more or less transversely oval, the claw 2.5–6 mm. long, auriculate, ciliolate basally, glabrous externally, villosulose within. *Filaments* 11–21 mm. long, villosulose basally or glabrous. *Stigma* simple or capitellate. *Style* 8.5–10.5 mm. long, glabrous. *Ovary* 2–2.5 mm. long, 1 mm. wide, oblong or linear, glabrous, 2–4-ovulate; gynophore 1.5–3.5 mm. long, puberulous or glabrous, inserted at the top of the adaxial hypanthial wall. *Fruit* 5.5–10 cm. long, 2.5–3 cm. wide, oblong-oblanceolate, glabrous, the carpophores 8–14 mm. long, glabrous. *Seed* 1–3 per fruit, about 1.5 cm. in diameter, suborbicular, the testa membranous, reddish-brown, smooth.

Key to the Varieties of *Macrolobium montanum*

1. Small shrub with glabrous branchlets; leaflets oval to suborbicular, leaf rachis 8–18 mm. long; bracteoles 6–6.5 mm. long, minutely puberulous on outer surface; filaments villosulose basally. Lower Amazon River region. . . . . 18a. var. *montanum.*

1. Tree 10–12 m. tall, young branchlets minutely puberulous, glabrescent; leaflets oblong, oblong-obovate, or obovate; leaf rachis (15–)25–32 mm. long; bracteoles 8 mm. long, glabrous on outer surface; filaments glabrous. Potaro River region of British Guiana. . . . . 18b. var. *potaroanum.*

18a. Macrolobium montanum var. montanum. Figure 7.

Small shrub 1–1.5 m. tall, the branchlets glabrous. *Leaf blades* with the leaflet pairs 7–11 mm. apart, the rachis 8–20 mm. long. *Leaflets* glabrous, oval to suborbicular, the lower side of the base rotund-obtuse. *Pedicels* minutely puberulous; bracteoles 5.5–6.5 mm. long, 3 mm. wide, minutely puberulous on the outer surface. *Filaments* basally villosulose. *Stigma* capitellate. *Gynophore* 1.5–2.5 mm. long, puberulous. *Fruit* 5.5–6.5 cm. long, the carpophores 8–10 mm. long, the seeds one per fruit.

LECTOTYPE: *A. Ducke (H.J.B.R. No.) 16947* (flowering portion), "Serra Pontada regione, Jutahy de Almeirim," Pará, Brazil, April 1923 (deposited NY, isolectotypes IAN, P, RB, U-in part, US-in part). A lectotype designation is obligatory here, because the single collection number cited in the original description consisted of two collections, one flowering and the other fruiting. The sheets at U and at US have parts of both collections mounted on the same sheet, hence the unusual manner of citation above. The NY sheet was selected as the lectotype because the label is in Ducke's hand, it bears only flowering material, and the locality data are exact. The flowering specimen on the US sheet is in even better condition, but it is accompanied by a portion of the fruiting material and the collection number on this sheet involves a transposition of the numerals. The RB material is of the flowering collection but its condition is inferior to either the NY or US sheets.

Additional Specimens: BRAZIL: Serra Pontada region, inter Almeirim et Prainha, Pará, Sept. 1923, *Ducke (H.J.B.R. No.) 16947-A* (fruiting portion) (F-frag., U-in part, US-in part). This collection is being cited as an "A"-number to distinguish between the two collections which were assigned the same number.

18b. Macrolobium montanum var. **potaroanum** Cowan, var. nov. **Figure** 7.

Arbor 10–13 m. alta, 1 dm. diametro, ramulis minute puberulis, glabrescentibus. Petiolus 8–11 mm. longus, glaber. Folia 2-3-jugata, paribus 10–17 mm. separatis; rachibus 15–32 mm. longis, glabris. Foliola 20–35 mm. longa, 10–20 mm. lata, oblonga, obovata vel oblongo-obovata, ad basim inaequalia, basis superiore latere cordato, inferiore acuto, ad apicem rotundata vel truncata, retusa, supra glabra vel sparsissime puberula in costa, infra glabra; costa saliens ambobus lateribus. Inflorescentiae 8 cm. longae, axe minutissime puberulo, pedunculo 1.5 mm. longo; bracteis 1.5 mm. longis, 1 mm. latis, triangularibus, ciliolatis sed aliter glabris; pedicellus 4–5 mm. longus, glaber; bracteolae 8 mm. longae, 3.5 mm. latae, ellipticae, acuminatae, intus sparse pilosulae, extus glabrae. Hypanthium 2 mm. longum, stipite 0.5 mm. longo, glabrum. Sepala 3–3.5 mm. longa, 1–1.5 mm. lata, lanceolata vel elliptica, acuta ad acuminata. Petali lamina 4 mm. longa, 5 mm. lata, transverse ovale, unguicilus 5 mm. longus, auriculatus. Filamenta 21 mm. longa, glabra. Stigma simplex. Stylus 10.5 mm. longus, glaber. Ovarium 2 mm. longum, 1 mm. latum, lineare, glabrum, 2-ovulatum, gynophoro 3.5 mm. longo, glabro. Fructus immaturus 10 cm. longus, 2.5 cm. latus, oblongus, apicem versus latior, glaber, carpophoro 12–14 mm. longo, glabro, 1-3-seminifer.

Type Collection: *D. B. Fanshawe 764 (F.D. No. 3500)*, "83 miles Bartica-Potaro Road," British Guiana, July 1942 (HOLOTYPE BGF).

Additional Specimens: BRITISH GUIANA: 85 miles Bartica-Potaro Road, Nov. 1947, *Fanshawe 2758 (F.D. No. 5557)* (BGF, U).

The diagnostic characters of this species clearly indicate its affinity with *M. microcalyx* and *M. urupaense*. It differs from the first of these by its less strongly dimorphic sepals, by its glabrous ovary, and its usually greater number of leaflets per leaf. From *M. urupaense* it may be separated by its fewer leaflet pairs, by its more or less pubescent bracteoles, and by its generally shorter, glabrous or basally villosulose filaments.

The two varieties included in this species are separable by the shape of their leaflets, length of their leaf rachises, size of their bracteoles, presence or absence of pubescence on the filaments, and by their geographic distribution.

19. Macrolobium urupaense Hoehne, Comm. Linh. Teleg. Estrat Matto-Grosso, Annexo n. 5, Bot. pt. 12: 11. pl. 184. 1922. **Figure 7.**

Shrub or small tree, the branchlets, leaves, and inflorescence glabrous. *Petioles* 8–10 mm. long, canaliculate. *Leaf blades* 5-7-jugate, the pairs about 12 mm. apart; rachis 5–8 cm. long, canaliculate-alate. *Leaflets* 15–45 mm. long, 10–20 mm. wide, oblong or oval-oblong, the base inequilateral, the upper side cordate, the lower side obtuse, the apex rotund, emarginate; costa plane on the upper surface, salient beneath, the venules obscure above, prominulous beneath. *Inflorescence* 5–6 cm. long (fide Hoehne); pedicels 5 mm. long (5–7 mm. fide Hoehne); bracteoles 10 mm. long, 5 mm. wide, broadly elliptic, acute, glabrous. *Hypanthium* 1.5 mm. long, glabrous. *Sepals* five, the adaxial pair nearly completely united, 2.5 mm. long, 1.5 mm. wide, triangular, acute, the other sepals 5 mm. long, 2–2.5 mm. wide, lanceolate, acute. *Petal* blade about 5 mm. long, 6 mm. wide, transversely oval, the claw 5 mm. long, strongly auriculate. *Filaments* 25 mm. long (30–35 mm. fide Hoehne), villose in the lower one-half or more. *Style* glabrous. *Ovary* 2.5 mm. long (1.5 mm. fide Hoehne), 1 mm. wide, oblong, glabrous, 4-ovulate (3-ovulate fide Hoehne), the gynophore 5 mm. long, puberulous, inserted at the top of the adaxial hypanthial wall. *Fruit* unknown.

Type Collection: *J. G. Kuhlmann 2029* (H.J.B.R. No. 7323), "Campos dos Urupás, Rondonia, Cataqui-Iamain, noroeste de Matto Grosso," Brazil, Dec. 1918 (RB).

This very poorly known species exhibits characters which ally it with *M. montanum* and *M. microcalyx*, the former being much the nearer relative of the two. *M. urupaense* shares with *M. montanum* the glabrous ovary character, but they may be differentiated by the larger number of leaflet pairs, glabrous bracteoles, and longer villose filaments of *M. urupaense*. From *M. microcalyx* this species may be readily recognized by its glabrous ovary and inflorescence.

20. **Macrolobium guianense** (Aubl.) Pulle, Enum. Vasc. Pl. Surinam 211. 1906. **Figure 10.**

Outea guianensis Aubl. Pl. Guian. 1: 29. *pl.* 9. 1775.
Macrolobium Utea Gmelin, Syst. Nat. ed. 13. 2(1): 93. 1796.
Macrolobium pinnatum Willd. Sp. Pl. 186. 1797.
Utea guyannensis (Aubl.) J. St.-Hil. Expos. Fam. 2: 203. 1805.
Macrolobium Outea Steud. Nom. Bot. 1: 503. 1821.
Vouapa guyanensis (Aubl.) Taub. Bot. Centralbl. 47: 394. 1891.
Vuapa guianensis (Aubl.) Kuntze, Rev. Gen. 1: 213. 1891.

Tall tree, to 5 m. diameter (fide Aublet), the branchlets pilosulose and puberulous. *Stipules* 6–7.5 mm. long, 0.5–1 mm. wide, linear, acuminate, persistent, ciliolate, glabrous within, pilosulose outside. *Petioles* 3–6 mm. long, canaliculate, pilosulose. *Leaf blades* 2-jugate, the pairs of leaflets 13–17 mm. apart; rachis 13–17 mm. long, pilosulose on the upper surface, the axis pilosulose beneath. *Leaflets* 27–56 mm. long, 15–26 mm. wide, oval to elliptic, the base inequilateral, the upper side subcordate to cordate, the lower side acute, the apex obtuse, retuse, minutely apiculate; upper surface more or less uncinate-puberulous on the costa, sparsely to sparingly pilosulose on the basal one-half or less of the costa beneath; costa salient, the venules prominent. *Inflorescence* 5–7.5 cm. long, the axis except the peduncle glabrous, the peduncle 12–13 mm. long, puberulous; bracts somewhat persistent, 7–7.5 mm. long, 1–1.5 mm. wide, lanceolate to linear, acuminate, ciliolate, otherwise glabrous; pedicels 4.5–8 mm. long, puberulous in two lines which coincide with the separation lines of the bracteoles; bracteoles 7.5–9 mm. long, 3.5 mm. wide, elliptic, apiculate, glabrous. *Hypanthium* 2 mm. long, sessile. *Sepals* five, the adaxial pair partly united, 2.5–3.5 mm. long, 1–1.5 mm. wide, the other sepals 4.5–6.5 mm. long, 1–2 mm. wide, lanceolate, glabrous, bluntly acute or obtuse. *Petal* blade about 6 mm. in diameter, orbicular, the claw 4.5 mm. long, weakly villosulose on the claw and up into the throat of the blade within, glabrous externally. *Filaments* about 20 mm. long, the lower part villosulose. *Style* glabrous. *Ovary* 2.5–4.5 mm. long, 1–1.5 mm. wide, oblong, sparsely pilosulose on one or both margins, the lateral surfaces glabrous, 4-ovulate; gynophore 2.5–4.5 mm. long, pilosulose, inserted in the hypanthium near the apex of the adaxial wall. *Fruit* unknown.

Type Collection: *F. Aublet s.n.*, Guiana (isotype BM).

Additional Specimens: SURINAM: *Hostmann & Kappler 254* (F, K, P, U, US, W). This collection has been variously cited as "Hostmann s.n.," "Hostmann 254," and as it is cited here, but all are undoubtedly parts of the same collection.

The nearest relative of *M. guianense* is probably *M. montanum* or *M. urupaense*, but the relationship to either is rather remote. It is easily recognizable from both of its presumed relatives by its oval or elliptic leaflets which are always in two pairs and by its persistent stipules.

21. **Macrolobium campestre** Huber, Bol. Mus. Goeldi 5: 389. 1909. **Figure 7.**

Shrub to large tree 35 m. tall, the branchlets and leaves glabrous, very rarely the branchlets sparsely puberulous or pilosulose. *Petioles* 5–30 mm. long, terete or weakly sulcate to subcanaliculate. *Leaf* blades 2–3-jugate, sometimes one leaflet of the terminal pair absent and then the leaf pseudo-imparipinnate, the pairs

9–30 mm. apart; rachis 10–60 mm. long, slightly canaliculate or terete on the upper surface, not at all alate. *Petiolules* 2–6 mm. long. *Leaflets* 4–12 cm. long, 2–6 cm. wide, the base inequilateral, acute to subcordate, the apex bluntly acute to long-acuminate; costa impressed on the upper surface, salient beneath, the venules prominulous. *Inflorescence* 4–28 cm. long, rather densely flowered, the axis pilose to puberulous, the peduncle 0–4 mm. long; bracts 5.5–12.5 mm. long, 1.5–4 mm. wide, lanceolate or elliptic, acuminate, pilose to puberulous; pedicels 2.5–4.5 mm. long, pilose to puberulous; bracteoles 5.5–8.5 mm. long, 3–3.5 mm. wide, oblong to elliptic, pilose to puberulous on the outer surface, pilosulose or glabrous within. *Hypanthium* 1–2 mm. long, glabrous to puberulous sparingly. *Sepals* five, the adaxial pair more or less united, 1.5–4 mm. long, 0.5–1.5 mm. wide, oblong to lanceolate or infrequently triangular, the other sepals 2–5 mm. long, 1–2 mm. wide, oblong or linear to elliptic or lanceolate, acute to obtuse. *Petal* blade 3.5–5.5 mm. long, 5–8 mm. wide, the claw 4–7 mm. long, more or less auriculate, glabrous or pilosulose externally, ciliolate basally, villosulose within, sometimes sparsely so and rarely glabrous. *Filaments* 17–22.5 mm. long, villosulose in the lower part. *Stigma* capitellate or capitate. *Style* 12.5–17 mm. long, glabrous or rarely sparsely puberulous basally. *Ovary* 2–3.5 mm. long, 1–1.5 mm. wide, oblong, glabrous or sparsely and minutely puberulous on the margins, 2–4-ovulate; gynophore 1.5–5 mm. long, subglabrous to pilosulose or puberulous, usually inserted near the apex of the adaxial hypanthial wall, but occasionally basal or midway on the wall. *Mature fruit* unknown.

Key to the Varieties of *Macrolobium campestre*

1. Leaves always paripinnate, leaflets broadly ovate or elliptic, two-thirds or less as long as wide; bracts densely pilose; shrub of campinas. .... 21c. var. *campestre*.
1. Leaves paripinnate or pseudo-imparipinnate, leaflets elliptic, lanceolate, or ovate, twice or more as long as wide; bracts pilosulose; tree of lowland forests. .... 2.
2. Inflorescence 16–28 cm. long; bracteoles glabrous or subglabrous on inner surface; leaves paripinnate. .... 4.
2. Inflorescence 4–12 cm. long; bracteoles strongly pubescent on inner surface; leaves pseudo-imparipinnate and paripinnate. .... 3.
3. Bracts 9 mm. long, lanceolate; leaflets mostly about 2–2.5 cm. wide; large tree (to 35 m.). .... 21a. var. *arboreum*.
3. Bracts 5.5–7 mm. long, elliptic or lanceolate-elliptic; leaflets mostly about 3.5–5 cm. wide; mediocre tree (to 20 m.). .... 21b. var. *medium*.
4. Branchlets puberulous; leaflets 4–6.5 cm. long, oval to elliptic, abruptly acute; inflorescence 25–28 cm. long, bracts 8 mm. long. .... 21d. var. *arirambense*.
4. Branchlets glabrous; leaflets 6–11.5 cm. long, ovate to lanceolate, acuminate; inflorescence 16–18.5 cm. long, bracts 10–12.5 mm. long. ....21e. var. *longibracteatum*.

21a. Macrolobium campestre var. arboreum Cowan, var. nov. Figure 7.

Arbor ad 35 m. alta, ramulis, petiolis, rachibus, petiolulisque glabris vel raro pilosulis sed glabrescentibus. Petiolus 5–23 mm. longus, teres. Folia 2–3-jugata, pari- vel pseudo-imparipinnata; rachibus (10–)20–45 mm. longa, leviter sulcatis. Petiolulus 2–4 mm. longus. Foliola 40–80 mm. longa, 20–35 mm. lata, ovata, lanceolata vel elliptica, ad basim plerumque obtusa, interdum acuta, ad apicem acuminata, raro acuta. Inflorescentiae 5.5–12 cm. longae, axe pilosulo; bracteis 9 mm. longis, 3 mm. latis, lanceolatis, acuminatis, ambobus lateribus puberulis; bracteolis 6–7 mm. longis, 3.5 mm. latis, ellipticis, pilosulis. Hypanthium glabrum. Petali lamina 3.5–5 mm. longa, 6 mm. lata, transverse ovalis, unguicilo 4.5 mm. longo. Ovarium glabrum, 2-ovulatum, gynophoro 3.5 mm. longo, puberulo. Fructus immaturus 12–13 cm. longus, 4 cm. latus, oblongus, apicem versus latior, glaber, carpophoro 6–13 mm. longo, puberulo.

Type Collection: *A. Ducke 16532*, "campinas sublonnens, Gurupa," Pará, Brazil, Sept. 1916 (HOLOTYPE US, isotypes G, P).

Additional Specimens: BRAZIL: campina d'Arumatéua, Rio Tocantins, Pará, July 1916, *Ducke 16261* (US); in insulis Breves aestuarii amazonica prope flumen Macujurbimzinho, Nov. 1922, *Ducke 16943* (U); near mouth of Rio Embira, Amazonas, June 1933, *Krukoff 4953* (A, F, G, MO, NY, U, UC, US).

21b. Macrolobium campestre var. medium Cowan, **var. nov. Figure 7.**

Arbor media, ad 20 m. alta, 30 cm. diametro, ramulis glabris vel raro sparse puberulis. Petiolus 7–25 mm. longus. Folia 2–3-jugata, paripinnata et pseudo-imparipinnata; rachibus 20–60 mm. longis, teretibus ad subcanaliculatis. Petiolulis 3–6 mm. longis. Foliola 4.5–12 cm. longa, 2.5–5.5 cm. lata, ovata, lanceolata, vel elliptica, ad basim acuta vel obtusa, ad apicem acuta ad acuminata. Inflorescentiae 4–9 cm. longae, axe puberulo; bracteis 5.5–7 mm. longis, 1.5–2.5 mm. latis, ellipticis vel lanceolato-ellipticis, puberulis. Hypanthium glabrum. Petali lamina 4–5.5 mm. longa, 5–8 mm. lata, unguicilo 5.5–7 mm. longo. Ovarium glabrum vel margine sparsissime et minutissime puberulum, 3–4-ovulatum, gynophoro 3.5–4 mm. longo, sparse puberulo.

Type Collection: *A. Ducke (H.J.B.R. No.) 10926-A*, "Belém do Pará," Brazil, April 1926 (HOLOTYPE US, isotype U).

Additional Specimens: BRAZIL: Pará: Aderson Camp near Tavio, Bôa Vista, Rio Tapajóz, April 1932, *da Costa 325* (F,G); Tapana, Belém, June 1918, *Ducke (H.A.M.P. No.) 17036* (H.J.B.R. No. 10926) (G, RB, U, US).

Vernacular Names: Brazil: "igarana xixy," "igarana vermelha."

21c. Macrolobium campestre var. campestre. Figure 7.

Shrub with glabrous branchlets. *Petioles* 8–12 mm. long. *Leaf blades* 2-jugate, paripinnate, the pairs 20–25 mm. apart; rachis 15–25 mm. long, slightly sulcate. *Petiolules* 3–5 mm. long. *Leaflets* ovate to broadly elliptic, the base rotund-obtuse to subcordate, the apex bluntly acute. *Inflorescences* branched from the base, rarely lateral branchlets above the base, (6–)12–14 cm. long, the axis densely pilose to pilosulose, sessile; bracts 8–9 mm. long, 3.5–4 mm. wide, flexuose-pilose on both surfaces, more densely so externally. *Hypanthium* sparingly puberulous. *Petal* blade 4.5–5 mm. long, 7–7.5 mm. wide, oval transversely, the claw about 4 mm. long. *Ovary* glabrous, or puberulous on the abaxial margin, 3-ovulate, the gynophore 2.5–3 mm. long, pilosulose, inserted at the top of the hypanthium.

Type Collection: *A. Ducke 8461*, "campos a E. de Faro," Pará, Brazil, Aug. 1907 (HOLOTYPE presumably at Museo Goeldi, isotypes F-frag., G). Material of this genus has not been received for study from the Museo Goeldi at Belém, Brazil.

Additional Specimens: BRAZIL: Pará: Bas Trombetas, campina do Achipica, Sept. 1910, *Ducke 10929* (G); Faro, campos a l'est, May 1911, *Ducke 11690* (G, US).

21d. Macrolobium campestre var. arirambense Cowan, **var. nov.**

Ramuli minute puberuli. Petiolus 10–20 mm. longus, leviter sulcatus. Foliorum lamina 2–3-jugata, paripinnata; rachibus 15–40 mm. longis, leviter sulcatis. Foliola 4–6.5 cm. longa, 2–3 cm. lata, ovalia ad elliptica, ad basim obtusa, ad apicem abrupte acuta, extremitate acuta. Inflorescentiae 25–28 cm. longae, axe brevipilosulo; bracteis 8 mm. longis, 3 mm. latis, elliptico-lanceolatis, acuminatis, intus glabris, extus brevi-pilosulis; bracteolis glabris intus, extus pilosis. Flores immaturi vel ab insectis vastati. Fructus (nimis maturus) circa 6 cm. longus, 3 cm. latus, oblongus, glaber, carpophoro 10 mm. longo, glabro.

Type Collection: *A. Ducke 14848*, "campos do Ariramba, Rio Trombetas," Pará, Brazil, Sept. 1913 (HOLOTYPE G, isotype G).

21e. Macrolobium campestre var. longibracteatum Cowan, var. nov. **Figure 7.**

Arbor parva, ramulis foliisque glabris. Petiolus 20–28 mm. longus, leviter canaliculatus. Folia 2–3-jugata, paripinnata; rachibus 3–5 cm. longis, leviter canaliculatis. Foliola 6–11.5 cm. longa, 2.5–4.5 cm. lata, ovata, ovato-lanceolata vel lanceolata, ad basim obtusa ad acuta, ad apicem acuminata. Inflorescentiae 16–18.5 cm. longae, axe brevi-pilosulo; bracteis 10–12.5 mm. longis, lanceolatis, acuminatis, brevi-pilosulis; bracteolis 8.5 mm. longis, 3 mm. latis, ellipticis, acuminatis, extus pilosulis, intus glabris vel sparsissime brevi-pilosulis. Sepala 2–3.5 mm. longa, 1–2 mm. lata, lanceolata. Petali lamina 4 mm. longa, 6 mm. lata, unguicilo 5 mm. longo. Ovarium 2–3 mm. longum, 1 mm. latum, glabrum, 3-ovulatum, gynophoro 1.5 mm. longo, puberulo. Fructus ignotus.

Type Collection: *A. Ducke 1242*, "Entroncamento, Belém," Pará, Brazil, June 1943 (HOLOTYPE MO, isotypes IAN, NY, US).

Unquestionably, the relationship of this species is with *M. arenarium*, but this pair of species is completely without ties to the other species of the genus. They may be regarded as the two extremes of a distinct line of relationship from which one group of unijugate species may have diverged. *Macrolobium campestre* exhibits the following characters which amply distinguish it from its only certain relative: (1) it has 2–3-jugate leaf blades, and (2) its bracts and bracteoles are pubescent, on one side at least.

Five subspecific taxa are recognized within this species and are here treated as varieties. Though these are "definitely accepted by the author," there is the realization that future collecting within the range of the species may very well merge some of the less distinct of these. However, in view of the data available, this disposition of the variants appears to be at least a practical solution to the problem.

Plants of the typical variety may be recognized by their shrubby habit, their relatively broad leaflets and by their pilose bracts. Only var. *arirambense* approaches it in aspect and the latter (var. *arirambense*) has very elongate inflorescences, the axis of which is short-pilosulose and its branchlets are puberulous. The relationship of the last-mentioned variety is much nearer var. *longibracteatum*, from which it is distinguished by its puberulous branchlets, differently shaped and smaller leaflets, longer inflorescences, and smaller bracts. The inflorescences of var. *longibracteatum* and *arirambense* are considerably longer than in any of the other varieties and are distinctly arcuate, suggesting that they may be pendent in nature.

Var. *arboreum* is quite distinct by virtue of its narrow leaflets which are smaller on the average than those of plants of the other varieties. It becomes a tree of considerable proportions, attaining heights of 35 m. according to the field notes of B. A. Krukoff. These characteristics and its longer, differently shaped bracts serve to separate it from its nearest relative, var. *medium*. As the epithet of the latter implies, this variety is transitional, between var. *longibracteatum* and *arboreum*. Its shorter bracts, puberulous bracteoles and shorter inflorescences serve to distinguish it from var. *longibracteatum*.

22. Macrolobium arenarium Ducke, Arch. Jard. Bot. Rio de Janeiro 3: 101. 1922. **Figure 7.**

Low shrub to 2 m. tall, the branchlets and leaves glabrous. *Petioles* 9–17 mm. long, terete. *Petiolules* 3–5 mm. long. *Leaflets* 5.5–10.5 cm. long, 3–5 cm. wide, equilateral, ovate to oval, the base equilateral, obtuse, the apex abruptly acuminate or subacuminate, the extremity obtuse to acute; costa strongly impressed on the upper surface, salient beneath, the venules subobscure. *Inflorescences* 4–5.5

cm. long, sessile, the axis glabrous or pilosulose; bracts 8.5–12.5 mm. long, 3–3.5 mm. wide, lanceolate, caudate-acuminate, sparingly ciliolate, the pedicels about 3–4 mm. long, glabrous or pilosulose; bracteoles 6–6.5 mm. long, 3.5 mm. wide, oblanceolate, or oblong-elliptic, the apex tufted and acute, glabrous otherwise. *Hypanthium* 1.5–2 mm. long, glabrous. *Sepals* five, the adaxial pair united nearly completely, 3.5–4 mm. long, 1–2 mm. wide, elliptic, acute to acuminate, glabrous except for the tufted apex. *Petal* blade 4–5.5 mm. long, 4.5–6.5 mm. wide, suborbicular to transversely oval, the claw 4 mm. long, glabrous externally, villosulose within. *Filaments* 15–20 mm. long, villosulose to pilosulose in the lower part. *Pistil* glabrous; stigma capitellate; style about 18 mm. long; ovary 3.5 mm. long, 1.5 mm. wide, narrowly oblong, 3–4-ovulate, the gynophore 2.5–3.5 mm. long, inserted in the base of the hypanthium. *Fruit* (post-mature) apparently elongate-oblong, the carpophores 10 mm. long.

LECTOTYPE: *A. Ducke (H.A.M.P. No.) 15831*, "Bella Vista, Rio Tapajóz, pres du dernier rapide," Pará, Brazil, Dec. 1915 (presumably deposited at Museo Goeldi, isolectotype G). The material of this genus in the Museo Goeldi has not been received for study.

Additional Specimens: BRAZIL: Campina do Perdido, prope Bella Vista, Pará, May 1923, *Ducke (H.J.B.R. No.) 10916* (G, NY, P, RB, U, US); Bella Vista, Rio Tapajóz, Pará, June 1918, *Ducke (H.A.M.P. No.) 17054* (G, US).

The latter collection and the lectotype collection were cited by Ducke in his original description but neither was designated as the type. Thus the selection of a lectotype was mandatory. Ducke stated in the discussion following the description of the species that the inflorescence was glabrous but one of the collections which he cited, *Ducke 17054*, has pilosulose inflorescences. Consequently, the other one was chosen for the lectotype because it was felt that it best typified Ducke's concept.

The petiolulate, equilateral leaflets of this species lend such a distinctive aspect to this plant that it is inconceivable that it might be confused with any of the other unijugate members of this section. It is intimately related to *M. campestre*, which has more than a single pair of leaflets per leaf, and bracts and bracteoles which are pubescent on one or both sides.

23. **Macrolobium canaliculatum** Spruce ex Benth. in Mart. Fl. Bras. 15(2): 219. 1870. **Figure 8.**

Vouapa canaliculata (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 393. 189.
Vuapa canaliculata (Spruce ex Benth.) Kuntze, Rev. Gen. 1: 213. 1891.

Small tree to about 12 m., the branchlets very minutely puberulous. *Petioles* 6–11 mm. long, very minutely puberulous, strongly canaliculate, depressed dorsiventrally. *Petiolules* 3–10 mm. long, very minutely puberulous. *Leaflets* 5.5–12 cm. long, 2.5–4.5 cm. wide, subequilateral, slightly arcuate, elliptic or oblong-elliptic, the base inequilateral, acute, the lower side long-decurrent on the petiolules, the leaflets narrowing toward the rotund-obtuse, entire or emarginate apex, very minutely puberulous at the base, epunctate; costa plane on the upper surface, salient beneath, the venules prominulous to prominent. *Inflorescences* 4–6.5 cm. long, the axis very minutely puberulous, the peduncles 6–11 mm. long; bracts 1.5 mm. long, 1–1.5 mm. wide, deciduous, triangular, ciliolate; pedicels 4–7 mm. long, glabrous; bracteoles 10.5 mm. long, 5 mm. wide, oblong-oblanceolate, glabrous. *Hypanthium* 3.5 mm. long on a stipe 3.5 mm. long, both glabrous. Sepals four, the adaxial one sometimes bifid, 9.5–11 mm. long, 3–4.5 mm. wide, elliptic to oblong, obtuse, ciliolate, glabrous otherwise. *Petal* usually retrorse, the blade 6–7 mm. long, 7–8 mm. wide, suborbicular, glabrous, the claw 6.5–7 mm. long, auriculate, villosulose on the costa of the claw, the auricles ciliolate; scale-like petalodia sometimes present. *Filaments* 20 mm. long, villosulose basally. *Stigma* capitate. *Style* 17 mm. long, glabrous. *Ovary* 3.5–4.5 mm. long, 1.5–2 mm. wide, oblong, glabrous, 3–5-ovulate, the gynophore 2.5 mm. long, glabrous. *Fruit* (old valves) about 9.5–13 cm. long, 4.5–5 cm. wide, oblong, strongly alate on the adaxial margin, the carpophore 10 mm. long, glabrous; seeds 3–5 per fruit, oval.

Type Collection: *R. Spruce 2781*, "In sylvis humilioribus fl. Uaupés," Amazonas, Brazil, Dec. 1852 (HOLOTYPE K, isotypes G, GH, NY, P, W).

Additional Specimens: BRAZIL: Upper Rio Curicuriary, trib. of Rio Negro, Nov. 1936, *Ducke 35190* (RB, US).

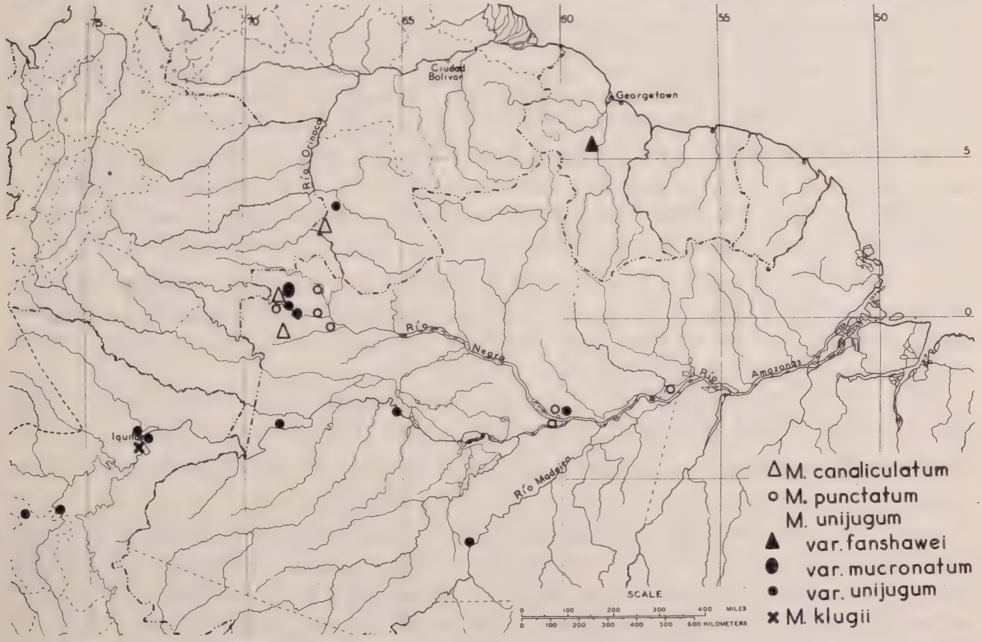
VENEZUELA: Cerro Yavita, Río Atabapo, Amazonas, Oct. 1950, *Maguire 29284* (NY, US).

There is ample morphologic evidence for assuming a rather close relationship between this species and *M. punctatum.* They both have a long-stipitate hypanthium and petiolulate leaflets, and they have a similar aspect. *M. canaliculatum* may be distinguished from its near relative by its epunctate leaflets, the apices of which are rotund-obtuse. In addition, *M. punctatum* also has much shorter sepals, smaller bracteoles, and narrower petal blade, and the petal is usually erect.

24. **Macrolobium punctatum** Spruce ex Benth. in Mart. Fl. Bras. 15(2): 219. 1870. **Figure 8.**

Vouapa punctata (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 394. 1891.
Vuapa punctata (Spruce ex Benth.) Kuntze, Rev. Gen. 1: 213. 1891.
Macrolobium punctatum Spruce ex Benth. forma *bijugum* Ducke, Arch. Inst. Biol. Veg. Rio de Janeiro 4: 14. 1938.

Shrub or small tree to 8 m. tall, the branchlets very minutely puberulous. *Petioles* 9–20 mm. long, sulcate on the upper surface, flattened dorso-ventrally, glabrous or very minutely puberulous. *Petiolules* 2–6 mm. long, glabrous or very minutely puberulous. *Leaflets* (8–)11(–16) cm. long, (2.5–)4(–6.5) cm. wide, strongly inequilateral, falcate, elliptic or lanceolate, the base strongly inequilateral, the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Ciudad Bolivar
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Rio Orinoco
Rio Negro
Rio Amazonas
Rio Madeira
Iquitos
Δ M. canaliculatum
o M. punctatum
M. unijugum
▲ var. fanshawei
● var. mucronatum
• var. unijugum
✖ M. klugii
SCALE
0 100 200 300 400 MILES
0 100 200 300 400 500 600 KILOMETERS

FIG. 8. Geographic distribution of *M. canaliculatum, M. punctatum, M. unijugum,* and *M. klugii.*

lower side rotund and long-decurrent, the upper side acute, the apex acute to acuminate, the extremity blunt, entire or emarginate; glabrous or the base very minutely puberulous on both surfaces or only on the upper surface, often conspicuously punctate beneath; costa somewhat salient on both sides, the venules prominent, or only prominulous beneath. *Inflorescences* 4–7.5 cm. long, the axis glabrous or very minutely puberulous, the peduncles 3–11 mm. long; bracts 1.5–2 mm. long, 1 mm. wide, caducous, triangular, glabrous except for the ciliolate margins; pedicels (1–)2.5–8 mm. long, glabrous or minutely puberulous; bracteoles 3.5–8 mm. long, 2–3.5 mm. wide, often caducous, oblong or oblong-obovate, carnose-coriaceous, the apex rotund, apiculate or cuspidate, glabrous. *Hypanthium* 2.5–3.5 mm. long, on a stipe 2–4 mm. long, glabrous. *Sepals* four, 4–7.5 mm. long, 2–4 mm. wide, oblong, apically rotund, concave, glabrous or somewhat ciliolate. *Petal* blade 3.5–6 mm. long, 4–4.5 mm. wide, oval to suborbicular, the claw 4–5.5 mm. long, auriculate basally, glabrous externally or pilosulose basally, ciliolate on the base of the claw, villosulose within on the claw and up to the center of the blade on the costa. *Filaments* 13.5–19.5 mm. long, villose in the lower part. *Stigma* capitate. *Style* 10–13 mm. long, glabrous. *Ovary* 2.5–4 mm. long, 1.5–2 mm. wide, more or less elliptic, the adaxial margin strongly alate, 2–4-ovulate, glabrous, the gynophore 2–2.5 mm. long, glabrous, inserted at the top of the adaxial wall of the hypanthium. *Fruit* (sub-mature) 6.5–15 cm. long, 4–5 cm. wide, oblong, glabrous, the adaxial margin with prominent thin wings, the carpophores 9–11 mm. long, glabrous. *Seeds* four per fruit, obovate (immature).

Type Collection: *R. Spruce 2734*, "In sylvis humilioribus circa Panure," Brazil, Dec. 1852 (HOLOTYPE K, isotypes G, GH, NY, P, W).

Additional Specimens: BRAZIL: Amazonas: João da Lapa, Estacamento, Rio Içana, May 1948, *Black 48-2731* (NY, U); Miri, Rio Tarumá, Manáos, Jan. 1946, *Ducke 1871* (F, GH, IAN, NY, US); campos a L'est de Faro, Jan. 1916, *Ducke (H.A.M.P. No.) 15911* (also cited as H.A.M.P. No. 15976 and H.J.B.R. No. 10910) (G, P, RB, US); Campina da Ponta Negra, Manáos, Oct. 1929, *Ducke 23292* and April 1932, *Ducke 23292-A* (US); Yucahy, above mouth of Rio Curicuriary, upper Rio Negro, Nov. 1929, *Ducke 23294* (G, P, U, US); Camanaos, Rio Negro, Sept. 1935, *Ducke (H.J.B.R. No.) 35191* (K) (type collection of *M. punctatum* fm. *bijugum* Ducke); Rio Negro, Padauiry, São Pedro, Oct. 1947, *Froes 22655* and *22664* (IAN); Rio Uaupés, Panure, Nov. 1947, *Pires 1091* (IAN); Rio Vaupés between Ipanoré and confluence of Rio Negro, Nov. 1947, *Schultes & Pires 9120* (US).

In this section there are only three species with a single pair of leaflets which are petiolulate, the above species, *M. canaliculatum*, and *M. arenarium*. The latter species is perhaps the most distinct of the species in the section because of its equilateral, oval or ovate leaflets which are not at all arcuate or falcate. *M. punctatum* most closely approaches *M. canaliculatum* but it may be distinguished by the usually strong punctation of the leaflets of the former as well as by its narrower, more or less erect petal, and smaller bracteoles. *M. canaliculatum* has the petal strongly recurved and much larger bracteoles.

There seems to be no justification for maintaining Ducke's forma *bijugum*, the sole difference being that some of the leaves have two pairs of leaflets.

25. **Macrolobium unijugum** (Poepp. & Endl.) Cowan, comb. nov. **Figure 8.**

Inga unijuga Poepp. & Endl. Nov. Gen. & Sp. Pl. 3: 79. 1845.

Tree or shrub 3–23 m. tall, the branchlets very minutely puberulous or glabrous. *Petioles* 8–25 mm. long, subsulcate to canaliculate, very minutely puberulous or glabrous. *Petiolules* to 3 mm. long sometimes present. *Leaflets* 10.5–30 cm. long, 3–10 cm. wide, inequilateral to subequilateral, more or less arcuate, elliptic, the base inequilateral, acute, decurrent, the apex obtusely acute to acuminate, the extremity rounded-truncate or acute; upper surface minutely puberulous on the costa or glabrous, beneath glabrous or minutely puberulous on the costa or also on the primaries, punctate or epunctate beneath; costa and primaries more or less impressed on the upper surface, salient beneath, the intramarginal nerve usually strongly developed. *Inflorescence* 1.5–7 cm. long, several fasciculate in loose clusters or solitary, the axis minutely puberulous, sessile or the peduncle to 2.5 mm. long; bracts 1–1.5 mm. long and wide, caducous, triangular, oblong, triangular-oblong or semicircular, ciliolate, glabrous within, minutely puberulous externally, acute to obtuse; pedicels 1.5–4.5 mm. long; bracteoles 4.5–7.5 mm. long, 2.5–5 mm. wide, rotund, apiculate or mucronate, oblong, obovate, or oblong-obovate, concave, glabrous on the inner surface, minutely puberulous externally. *Hypanthium* 1–3.5 mm. long on a stipe 0.5–1.5 mm. long, glabrous. *Sepals* four or five, 2–7 mm. long, 1–5 mm. wide, obtuse or acuminate, oblong, lanceolate, triangular, or oval, ciliolate, glabrous within, glabrous to sparsely puberulous externally. *Petal* blade 4.5–6.5 mm. long, 4–7 mm. wide, oval to orbicular, the claw 3–6.5 mm. long, auriculate or non-auriculate, glabrous externally or pilosulose at the base, ciliolate in the lower part of the claw, villose within on the claw and into the throat or to the center of the blade, or the blade glabrous. *Filaments* 15–25 mm. long, more or less villose or villosulose basally, the anthers 1.5–2.5 mm. long, 1–1.5 mm. wide. *Stigma* simple or capitellate. *Style* 12–18.5 mm. long, glabrous to sparsely puberulous basally. *Ovary* 1.5–2.5 mm. long, 1–1.5 mm. wide, oval to oblong to elliptic, puberulous on the margins, glabrous on the lateral surfaces, rarely puberulous on all surfaces, 2–6-ovulate; gynophore 2–3.5 mm. long, glabrous or minutely puberulous, inserted at the margin of the hypanthium. *Fruit* 10 cm. long, 6.5 cm. wide, obovate, glabrous, irregularly salient-venose, the adaxial margin with woody wings.

Key to the Varieties of *Macrolobium unijugum*

1. Costa and primary veins, including intramarginal vein, markedly impressed on upper leaflet surface, leaflets punctate beneath; inflorescences 1.5–4.5 cm. long, several fasciculate in loose clusters. . . . . 25c. var. *unijugum.*
1. Costa impressed but primaries not impressed on upper surface, leaflets epunctate beneath; inflorescences 4.5–7 cm. long, borne singly or few together but not in loose clusters. . . . . 2.
2. Sepals five, lanceolate, 2–3 mm. long; hypanthium 1 mm. long on 0.5 mm. stipe; apex of bracteoles apiculate; anthers 1.5 mm. long, oval; leaflets sessile. Northern British Guiana. . . . . 25a. var. *fanshawei.*
2. Sepals four, oblong, 6–6.5 mm. long; hypanthium about 2.5 mm. long on 1 mm. stipe; apex of bracteoles mucronate; anthers 2.5 mm. long, oblong; leaflets sometimes with petiolules to 3 mm. long. Northwesternmost Brazil. . . . . 25b. var. *mucronatum.*

25a. Macrolobium unijugum var. fanshawei Cowan, **var. nov. Figure 8.**

Arbor 20 m. alta, 2 dm. diametro, ramulis glabris. Petiolus 12–15 mm. longus, canaliculatus, glaber. Foliola 12–18.5 cm. longa, 4.5–7 cm. lata, subaequilateralia, elliptica, ad basim inaequilateralia, acuta, ad apicem abrupte acuminata, extremitate obtuso, glabra, epunctata, costa impressa supra, infra salienti, venulis subobscuris supra, infra prominentibus. Inflorescentiae 5 cm. longae, solitariae, axe minute puberulo, pedunculis 2–2.5 mm. longis; bracteis caducis; pedicello 3.5–4 mm. longo, minute puberulo; bracteolis 6 mm. longis, 3 mm. latis, oblongis, apiculatis, intus glabris, extus minute puberulis. Hypanthium 1 mm. longum, stipite 0.5 mm. longo, glabrum. Sepala quinque, 2–3 mm. longa, 1–1.5 mm. lata, duobus adaxilibus triangularibus, acuminatis, 3 ceteris lanceolatis, acuminatis, ad apicem ciliolatis. Petali lamina 5 mm. diametro, orbicularis, unguicilo 4 mm. longo, exauriculato. Filamenta 17.5 mm. longa, basim versus sparse villosula, antherae 1.5 mm. longae, 1 mm. latae. Stigma subpeltato-capitellatum. Stylus 15.5 mm. longus, glaber. Ovarium 2 mm. longum, 1 mm. latum, oblongum, solum mar-

ginibus puberulis, lateraliter glabrum, 2-ovulatum, gynophoro 3 mm. longo, minute puberulo.

Type Collection: *D. B. Fanshawe 752* (F.D. 3488), "Mahdia Ck., Potaro R., 108 m. Bartica-Potaro Road," British Guiana, June 1942 (HOLOTYPE BGF). Known only by the type collection.

25b. Macrolobium unijugum var. mucronatum Cowan, var. nov. Figure 8.

Arbor parva, ramulis minutissime puberulis. Petiolus 18–25 mm. longus, leviter sulcatus, minutissime puberulus. Petioluli (0–)3 mm. longi. Foliola 20–30 cm. longa, 5.5–9 cm. lata, plus minusve aequilateralia, elliptica, ad basim inaequilateralia, acuta, ad apicem acuminata, extremitate obtusa vel acuta, superficie epunctata, supra glabra, infra in costa minutissime puberula; costa impressa supra, infra salienti, venulis prominulis supra, infra prominentibus. Inflorescentiae 4.5–7 cm. longae, axe minutissime puberulo; bracteis 1.5 mm. longis et latis, triangulari-oblongis, ciliolatis, intus glabris, extus minute puberulis; pedicelli 2–3 mm. longi; bracteolis 7.5 mm. longis, 4 mm. latis, oblongo-obovatis, valde mucronatis, intus glabris, extus minute puberulis. Hypanthium 2.5 mm. longum, stipite 1 mm. longo, glabrum. Sepala quattuor, 6–6.5 mm. longa, 2–3 mm. lata, oblonga, obtusa, glabra vel sparse ciliolata. Petali lamina 6 mm. longa, 5 mm. lata, ovalis, glabra, unguicilo 5.5 mm. longo, exauriculato. Filamenta 20.5 mm. longa, basim versus sparse villosula, antheris 2.5 mm. longis, 1.5 mm. latis, oblongis. Stigma capitellatum. Stylus 18.5 mm. longus, ad basim sparse puberulus. Ovarium 2 mm. longum, 1 mm. latum, oblongo-ovale, puberulum, 2-ovulatum, gynophoro 2.5 mm. longo, puberulo.

Type Collection: *A. Ducke 35188*, "Igarapé Yurupary affl. Rio Uaupés," Amazonas, Brazil, Sept. 1935 (HOLOTYPE US, isotypes G, P, U). Known only by the type collection.

25c. Macrolobium unijugum var. unijugum. Figure 8.

Inga unijuga Poepp. & Endl. Nov. Gen. & Sp. Pl. 3: 79. 1845.
Macrolobium limbatum Spruce ex Benth. Trans. Linn. Soc. 25: 307. 1865.
Vouapa limbata (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 393. 1891.
Vuapa unijuga (Poepp. & Endl.) Kuntze, Rev. Gen. 1: 213. 1891.

Tree 3–23 m. tall, branchlets very minutely puberulous. *Petioles* (8–)15–20 (–25) mm. long, subsulcate, very minutely puberulous. *Leaflets* 10.5–30 cm. long, 3–11 cm. wide, sessile, punctate on the lower surface, the base acute, the apex bluntly acute or subacuminate; costa and primary veins strongly impressed on the upper surface, the intramarginal vein prominently produced. *Inflorescences* 1.5–4.5 cm. long, several fasciculate in loose clusters; bracteoles obovate or oblong-obovate, rotund apically or sometimes apiculate. *Hypanthium* 2–3.5 mm. long. *Sepals* four, 4–7 mm. long, 2–5 mm. wide, oblong or oval, obtuse. *Anthers* 1.5 mm. long, 1 mm. wide.

Type Collection: *E. Poeppig 2801*, "Brasilia. In sylvis ad Ega," Nov. 1831. (HOLOTYPE W, isotypes P, W).

Additional Specimens: BRAZIL: Amazonas: Manáos, Aug. 1935, *Ducke 22* (A, F, IAN, MO, NY, US); São Paulo de Olivença, Nov. 1927, *Ducke 20316* (G, U, US); circa Cachoeira do Mindu, Manáos, Sept. 1929, *Ducke (H.J.B.R. No.) 23295* (G, RB, U, US); Manáos, Feb. 1945, *Froes 20497* (IAN); Porto Cucuruhy, Rio Negro, Oct. 1945, *Froes 21114* (F, IAN, NY), *21114a* (IAN, NY, U); Manáos, Oct. 1929, *Killip & Smith 30157* (A, F, NY, US); near Tres Casas, Municip. Humaytá, Sept.–Oct. 1934, *Krukoff 6243* (A, F, MO, NY, U, US); Rio Uaupés, afl. do Rio Negro, April 1947, *Pires 326* (IAN, NY); Tefé, Oct. 1948, *Pires 1308* (IAN); Rio Vaupés between Ipanoré and confluence of Rio Negro, Taracuá, Nov. 1947, *Schultes & Pires 9032* (US); in caatingas secus fluv. Uaupés, Nov. 1852, *Spruce 2668* (type collection of *Macrolobium limbatum*; HOLOTYPE K, isotypes G, GH, NY, P, W).

PERU: Loreto: Mishuyacu near Iquitos, Oct.–Nov. 1929, *Klug 418* (F, NY, US) and Dec. 1929, *Klug 663* (F, NY, US); Balsapuerto, Jan. 1933, *Klug 2867* (A, F, G, GH, MO,

NY, US); Sachachoro, near Yurimaguas, Oct. 1931, *Mexia 6088* (F, G, GH, MO, NY, U, UC, US).

VENEZUELA: San Antonio, Río Orinoco, Amazonas, April 1942, *Williams 15076* (F, US, VEN).

Vernacular Names: Brazil: "faveira."

This species, the two preceding ones, and the one following have been interpreted as comprising a complex which may have diverged from the *M. campestre*–*M. arenarium* line of relationship. However, this disposition is admittedly more a matter of convenience than of any very impressive morphology.

Unquestionably, the nearest relative of *M. unijugum* is the following species, *M. klugii*. The leaflets of *M. unijugum* are quite different in shape and are borne on generally longer petioles, and its ovary is more or less pubescent.

The typical variety has a somewhat different aspect, largely because the costa and primary veins are strongly impressed on the upper leaflet surface, while only the costa is impressed in the other varieties. Its shorter inflorescences, fasciculate in loose clusters, also lend a distinctive aspect to the typical form. These characters separate it from its nearest relative, variety *mucronatum*, but the latter also has mucronate bracteoles, longer anthers, and leaflets which are sometimes petiolulate.

Var. *fanshawei* is named in honor of Mr. D. B. Fanshawe, Conservator of Forests of British Guiana and outstanding student of the flora of this region. It is to be distinguished from the other varieties by its five, smaller sepals, which are somewhat dimorphic, and by its disjunct geographic distribution.

Inga unijuga was described in 1845 on the basis of *Poeppig 2801*, although this number (nor any other number) was not cited in the original description. In 1870 Bentham described *Macrolobium limbatum* with a Spruce collection as the basis and it was not recognized that the two were synonymous until 1891 when Kuntze transferred the species to *Vouapa* as *V. unijuga*. There is no doubt that the two names apply to the same taxon after one has studied both collections.

The Poeppig collection was very probably sterile. The initial description states that the portion relating to the legume was taken from field notes. Whereas the flowers of other species described by Poeppig and Endlicher at the same time and in the same place were quite abundantly characterized, those of *I. unijuga* were described only as "Flores albi." It is probable that Poeppig only observed the flower color without obtaining flowering material. In fact, the label on the Paris sheet specifically states that he made the collection without flowers and fruit ("sine fl. et fr. legi").

Besides the sheet at Paris, which is identified only as "Inga?", there are two sheets at Vienna, one of which is annotated as "Inga unijuga Poepp." and is regarded as the holotype.

26. Macrolobium klugii Cowan, sp. nov. Figure 8.

Arbustum 2 m. altum, ramulis glabris. Petiolus 7–9 mm. longus, leviter sulcatus, glaber. Foliola 11.5–17 cm. longa, 2.5–4.5 cm. lata, subaequilateralia, angusto-elliptica, ad basim inaequilateralia, acuta, decurrentia, ad apicem acuta et extremitate acuta, glabra, epunctata; costa leviter impressa supra, infra valdissime salienti, venulis prominulis. Inflorescentiae circa 4 cm. longae, terminales, axe minutissime puberulo; bracteis caducis, 1 mm. longis et latis, ovatis, caudato-acuminatis, intus glabris, extus minuto-puberulis, ciliolatis; pedicelli 4–5 mm. longi; bracteolis 6.5 mm. longis, 3 mm. latis, ellipticis, intus glabris, extus minutissime puberulis. Hypanthium 2 mm. longum, sessile, glabrum. Sepala quattuor, 5–5.5 mm. longa, 1.5–2 mm. lata, oblonga, vel ovali-elliptica, obtusa, glabra. Petalum ignotum. Filamenta 17.5 mm. longa, ad basim sparse villosa. Stigma nonnihil peltatum. Stylus 12.5 mm. longus, glaber. Ovarium 2 mm. longum,

1 mm. latum, oblongum, glabrum, 5-ovulatum, gynophoro 2.5 mm. longo, glabro vel sparsissime puberulo. Fructus ignotus.

Type Collection: *G. Klug 1353*, "Mishuyacu near Iquitos, alt. 100 meters, forest," Dept. Loreto, Peru, May 1930 (HOLOTYPE US, isotype F).

The characters of *M. klugii* place it nearest *M. unijugum* from which it differs in its narrowly elliptic leaflets borne on much shorter petioles and its completely glabrous ovary.

27. **Macrolobium bifolium** (Aubl.) Pers. Syn. Pl. 1: 39. 1805. **Figure 9.**

Vouapa bifolia Aubl. Pl. Guian. **1**: 25. *pl.* 7. 1775.
Macrolobium Vouapa Gmel. Syst. Nat. ed. 13. 2(1): 93. 1796.
Macrolobium hymenaeoides Willd. Sp. Pl. **1**: 186. 1797.
Vuapa bifolia (Aubl.) J. St.-Hil. Expos. Fam. 2: 209. 1805.

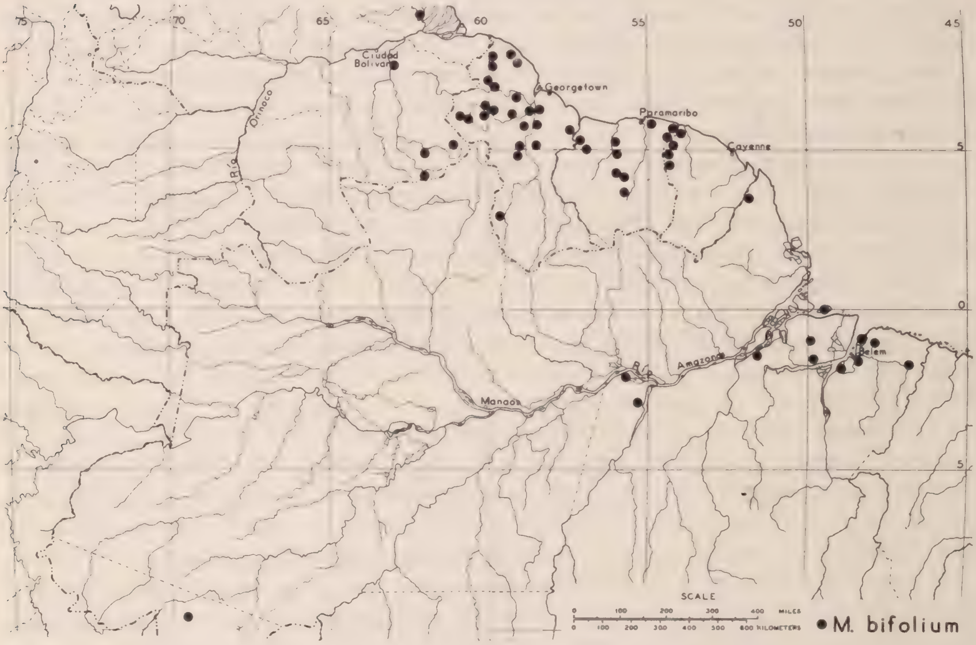

FIG. 9. Geographic distribution of *M. bifolium.*

Macrolobium stamineum Mey. Prim. Fl. Esseq. 18. 1818.
Vouapa staminea (Mey.) DC. Prodr. 2: 511. 1825.
Macrolobium elegans Miq. Ann. Sci. Nat. III. **1**: 40. 1844.

Tree 2–20 m. tall, 2–4 dm. in diameter, the branchlets and leaves glabrous or rarely the branchlets very minutely puberulous. *Petioles* (4–)10(–18) mm. long, canaliculate on the upper surface; the rachis rudiment about 5.5 mm. long, early caducous, linear-acicular. *Leaflets* (6.5–)10(–24) cm. long, (2.5–)4(–8) cm. wide, inequilateral, arcuate to falcate, elliptic to oblong, the base inequilateral, acute, the apex acute to acuminate, the extremity usually obtuse, entire to emarginate, epunctate; costa sulcate above, salient on the lower surface, the venules prominent to conspicuous. *Inflorescences* to 19.5 cm. long, averaging about 5–7 cm. long, borne singly or 2–5 in fascicles, the axis densely puberulous, the peduncles 1–6 mm. long; bracts 0.5–2 mm. long, 1–2 mm. wide, caducous, triangular, acute, ciliolate, glabrous within, densely puberulous externally; pedicels (1.5–)5(–6.5) mm. long, densely puberulous; bracteoles (3–)5(–8.5) mm. long, 2.5–4.5 mm. wide,

usually oval, oblong, or elliptic, the apex acute, glabrous within, densely puberulous externally. *Hypanthium* 1-2.5 mm. long on a stipe to 1.5 mm. long, both usually sparsely and minutely puberulous. *Sepals* typically four, infrequently five (the adaxial pair incompletely united), (3-)5(-6.5) mm. long, (1.5-)2.5(-4.5) mm. wide, oblong to elliptic, infrequently lanceolate or ovate, usually obtuse, sometimes acute to acuminate, more or less minutely puberulous on the costa externally or glabrous. *Petal* blade (4-)5-6(-7.5) mm. long, (3.5-)5(-8) mm. wide, oval or orbicular, infrequently transversely oval, the claw (3.5-)5(-7.5) mm. long, subauriculate to auriculate basally, glabrous externally or pilose sparingly at the base, sparingly to strongly villose within, the claw more or less ciliolate. *Filaments* (14-)20(-24) mm. long, villose in the lower part. *Stigma* simple or capitellate. *Style* (12-)20(-25.5) mm. long, pilosulose at the base. *Ovary* 1-3 mm. long, 1-1.5 mm. wide, oval to oblong or ovate, pilosulose on one or both margins, papillate-puberulous on the lateral surfaces, or papillate-puberulous or puberulous on all surfaces, (1-)2(-3)-ovulate; gynophore 2-4 mm. long, pilosulose and papillate-puberulous or only papillate-puberulous, inserted at any point between the base and the apex of the hypanthium on the adaxial wall. *Fruit* 8-14 cm. long, 4-8.5 cm. wide, asymmetrically oblong or oval-oblong, broader toward the apex, the adaxial margin dilated into thick wing-like ridges, densely and minutely papillate, the carpophores 4-17 mm. long, glabrous to sparingly pilosulose or minutely papillate. *Seed* one per fruit, 3-4.5 cm. long, 2-4 cm. wide, oblong, oval, or orbicular, the testa crustose and more or less reticulate-venose.

Type Collection: *F. Aublet s.n.*, "Cayenne" (isotype BM).

Additional Specimens: BRAZIL: Rio de Janeiro: Cult. Horto Bot. Rio de Janeiro, Feb. 1916, *Constantino (H.J.B.R. No.) 7621* (RB, U, US); Bot. Gds. Rio de Janeiro, June 1918, *Whitford 33* (GH, US, Y). Pará: Utinga, Belém, Aug. 1942, *Archer 7611* (NY); South Forest of I.A.N. Belém, Nov. 1942, *Archer 7885* (F); Belém, coffee plantation of I.A.N., Oct. 1947, *Black 831* (IAN); Antonio Lemos, Igarapé Pixuna, July 1948, *Black 48-2993* (IAN, U); near Oiapoque, Terr. Amapá, Oct. 1949, *Black 49-8300* (IAN); Pará, Nov. 1829, *Burchell 9746* (GH, NY); Bôa Vista, Rio Tapajóa, Aug. 1932, *Capucho 393* (F, IAN); Utinga, Belém, Oct. 1940, *Ducke 592* (F, IAN, MO, NY, US); forest reserve, Belém, Aug. 1942, *Ducke 7611* (F, NY); Santa Izabel, Belém-Bragança, Sept. 1908, *Ducke 9675* (G, US); Faro, May 1911, *Ducke 11696* (G, U); Obidos, campos do Mariapixy, July 1912, *Ducke 11953* (G); Garupá, Dec. 1916, *Ducke 16691* (G, P, US); Insulis Breves, May 1923, *Ducke 16942* (U); Castanhal, Colonia 3 de Outubro, Dec. 1949, *Froes 24891* (IAN, NY); Rio Oiapoque, Terr. Amapá, Jan. 1950, *Froes 25703* (IAN) and Oct. 1950, *26713* (IAN, NY); Belém do Pará, Nov. 1902, *Goeldi 3011* (G); Igarapé Mexiana, Sept. 1901, *Guedes 2297* (G); Ourém, Rio Guamá, Dec. 1899, *Huber 1810* (G); Rio Aramá, Breves, March 1900, *Huber 1891* and *1892* (G); Ilha do Mosqueiro near Pará, Nov. 1929, *Killip & Smith 30662* (NY, US, W); near Abaeté, Aug. 1934, *Krukoff 5861a* (A, MO, NY, U, US); Ilha Marajó, Nov. 1907, *Lutz 9474* (U); Santa Maria, Thomé Assú, Dist. Acará, July 1931, *Mexia 5935* (F, GH, MO, NY, U, UC, US); Belém, Utinga, Aug. 1945, *Pires & Black 98* (IAN); Bussuquara, Utinga, Belém, Nov. 1945, *Pires & Black 790* (IAN, NY); Belém, near Euna, Sept. 1942, *da Silva 97* (IAN).

VENEZUELA: Bolivar: Río Caroní, May 1945, *Cardona 1159* (US, VEN); Río Uonán, afluente del Ikabaru, Oct. 1946, *Cardona 1707* (NY, US, VEN); Río Uaiparú, afl. del Ikabaru, 1946, *Cardona 1913* (NY); orillas del río Iktebe, *Cardona 2161* (VEN); orillas del río Cuyuni, Feb. 1949, *Cardona 2790* (NY); Sta. Elena de Uairén, alto Caroní, April 1946, *Lasser 1438* (NY); Sta. Elena, Río Uairén, Gran Sabana, March 1946, *Tamayo 3156* (US, VEN). Delta Amacuro: Orinoco Delta, Río Manimo, March 1911, *Bond, Gillin & Brown 215* (GH, NY, US).

BRITISH GUIANA: Kalacoon, Mazaruni R., Oct. 1923, *Altson 33* (P); Juanita, Amacura R., NW Dist., July 1908, *Anderson 52* (BGF); Kaituma R., NW Dist., Oct. 1908, *Anderson 52A* (BGF); Arawau R., NW Dist., July 1934, *Archer 2340* (US); Kartabo Region, Cuyuni R., Aug. 1920, *I. W. Bailey 108, 173* (GH); Waini R., NW Dist., Sept. 1921, *de la Cruz 1126* (GH, NY, US); upper Rupununi R., near Dadanawa, June 1922, *de la Cruz 1480* (F, G, GH, MO, NY); between Demerara and Berbice Rivers, July 1922, *de la Cruz 1658* (F, GH, MO, NY, UC, US); upper Mazaruni R., Sept.-Oct. 1922, *de la Cruz 2247, 2273, 2376* (F, GH, MO, NY, UC, US); Kamakusa, upper Mazaruni R., Nov. 1922, *de la Cruz 2826* (F, NY, US); Pomeroon R., Pomeroon Dist., Dec. 1922, *de la Cruz 3228* (F, GH, MO, NY, UC, US);

Wanama R., NW. Dist., May 1923, *de la Cruz 4016* (F, GH, MO, NY, US); Assakatta, NW. Dist., Sept. 1923, *de la Cruz 4361* (NY, US); Moraballi Creek, April 1941, *Fanshawe 693* (F.D. 3429) (BGF, U); bank of Potaro R., Tumatumari, July 1921, *Gleason 406* (GH, NY, US); Tumatumari, along Potaro R., June–July 1921, *Gleason 934* (NY); Penal Settlement, Dec. 1919, *Hitchcock 17243* (GH, NY, US); right bank of Canje R., opposite Kabayari Creek, Dec. 1914, *Hohenkerk 52-B* (BGF); British Guiana, 1843, *Hostmann 1136* (G); Orealla Savanna, Corantyne R., Sept. 1879, *im Thum s.n.* (P); Orealla, Corantyne R., Oct. 1879, *Jenman 36* (P); Mazaruni R., Aug. 1889, *Jenman 5245* (NY); Membaro Creek, upper Mazaruni R., Sept. 1938, *P-27* (F.D. 2791) (BGF); British Guiana, June 1924, *Persaud 34* (F, UC); Membaru Creek, upper Mazaruni R., Sept. 1938, *Pinkus 29* (F, G, GH, MO, NY, US); Moraballi Creek, near Bartica, Essequibo R., Sept. 1929, *Sandwith 275* (NY, U); Essequibo R., 1836, *Schomburgk 10* (G, NY, W); Guiana angl. *Schomburgk 133* (P, W); Guiana, 1841, *Schomburgk 210* (G, P, U, W); British Guiana, 1838, *Schomburgk 375* (F, G, GH, P, US, W); Mazaruni Station, right bank of Mazaruni R., May 1933, *Tutin 93* (US); Kantume R., July 1908, no collector or number (NY).

SURINAM: Bover Cottica, *Focke 697* (U) (TYPE of *M. elegans* Miq.); Assirikama, Corantyne R., Sept. 1911, *Gonggrypp 113* (U); Surinam, *Hostmann 1056* (GH, P, W); Surinam, 1842, *Hostmann & Kappler 1136* (F, G, MO, P, U, W); Marowyne R., Sept. 1846, *Kappler 1930* (P, U); middle Marowyne R., Aug., *Kappler 2003* (U); Surinam, *McArthur s.n.* (Yale For. Herb. No. 35409) (Y); Tafelberg Creek, Saramacca R., Oct. 1944, *Maguire 24895* (F, MO, NY, U, US); Surinam, *Miquel s.n.* (NY); Bover-Surinam R., near Goddo, Jan. 1938, *Mt. Wilhemina Exped. 75* (U); Bover Gran Río Maupedam, Feb. 1938, *Mt. Wilhemina Exped. 183* (U); Watramiri, Oct. 1918, *Sur. For. Bur. 4035* (U); Watramiri, March 1919, *Sur. For. Bur. 4300* (IAN, U); Watramiri, Oct. 1919, *Sur. For. Bur. 4431* (IAN, U); Watramiri, Feb. 1920, *Sur. For. Bur. 4546* (MO, U, US); Watramiri, Dec. 1920, *Sur. For. Bur. 4999* (MO, U); Watramiri, June 1921, *Sur. For. Bur. 5263* (U); Watramiri, Oct. 1921, *Sur. For. Bur. 5407* (IAN, MO, U, US); upper Suriname R., June 1921, *Sur. For. Bur. 5468* (U, US); Watramiri, Dec. 1921, *Sur. For. Bur. 5579* (U); Coppename inf. Aug. 1903, *Went 124* (U); *Wullschagel 819-A* (W); Albina, Río Marowyne, Sept. 1853, *Wullschlagel 1434* (W).

FRENCH GUIANA: Gourdonville, Sept. 1914, *Benoist 1615* (P); La Charbonnère, Oct. 1948, *For. Service 4254* (U); Guyane-Française, 1792, *Leblond 192* (G); Guyane Française, 1834, *Leprieur 341* (G, P); 1838, *Leprieur s.n.* (P); Cayenne, *Martin s.n.* (F); Maroni, 1845, *Melinon 5* (GH, P), 1876, *Melinon 80* (G, P), 1861, *Melinon 117* (P); Couana, *Melinon 131* (NY, P, US); Acarouany, 1876, *Melinon 227* (A, BM, K, P); banks of Maroni R., 1862, *Melinon 420* (A, F, G, GH, NY, P, US); French Guiana, 1863, *Melinon s.n.* (F, P); Maroni, 1864, *Melinon s.n.* (F, GH, NY, P, US); French Guiana, 1820, *Perrottet s.n.* (G); Guiane, *Poiret s.n.* (P); *Richard s.n.* (P); Karouany 1854, *Sagot 185* (GH, P); Acarouany, 1856, *Sagot 185* (P, W); Maroni, *Wachenheim 184* (P).

Vernacular Names: Brazil: "ipe", "ipezeiro". Venezuela: "parue-dek" (Arekuna). British Guiana: "sarebebe" (Arawak, "water wallaba", "bootooba". Surinam: "watrabirihoedoe".

The four more or less closely related species, *M. bifolium*, *M. latifolium*, *M. angustifolium*, and *M. duckeanum*, probably constitute a divergent line from the main unijugate line of relationship. Of these, the first two are undoubtedly the most closely related of the four. *Macrolobium bifolium* differs from *M. latifolium* by the former's smaller, less coriaceous bracteoles, and its smaller bracts which are glabrous on the inner surface; and the hairs of all its parts are predominantly ribbon-like. Also, whereas *M. bifolium* is widely distributed, *M. latifolium* is narrowly restricted to the Bahia region of eastern Brazil. The hairs of the latter are clavate and a few such hairs are sometimes to be observed scattered amid the ribbon-like hairs of *M. bifolium.*

This species has more frequently been confused with *M. angustifolium* but they may be separated by a number of good characters. The costa of the leaflets is sulcate on the upper surface in *M. bifolium* but strongly salient in *M. angustifolium.* The shape and size of the bracts are completely different and the bracteoles of the latter species are pubescent on the inner surface, as are the bracts, but glabrous within in *M. bifolium.* The ovary of the latter is pubescent on all surfaces and this pubescence persists on the fruit, but the ovary of its relative is pubescent only on the margins and its fruit is glabrous or with only a few marginal hairs.

28. Macrolobium latifolium Vogel, Linnaea 1: 414. 1837.

Vouapa latifolia (Vog.) Taub. Bot. Centralbl. 47: 393. 1891.
Vuapa latifolia (Vog.) Kuntze, Rev. Gen. 1: 213. 1891.

Shrub 3 m. tall, the branchlets and leaves glabrous or infrequently the branchlets very minutely puberulous. *Petioles* 3–13 mm. long, sulcate to canaliculate. *Leaflets* 5–15 cm. long, 2.5–7 cm. wide, inequilateral, arcuate to subfalcate, elliptic, the base inequilateral, acute, the apex acute, sometimes inequilaterally so, the extremity obtuse, entire or emarginate, punctate or epunctate beneath; costa impressed on the upper surface, salient beneath, the venules prominent. *Inflorescences* 4.5–14 cm. long, the axis densely puberulous, the hairs short and clavate, the peduncle 3–10 mm. long; bracts 3.5–5 mm. long, 2.5–4.5 mm. wide, triangular-ovate, acute, concave, thick-coriaceous, pilosulose on the inner surface, densely puberulous externally; pedicels 1–5 mm. long; bracteoles 6–8.5 mm. long, 3–5.5 mm. wide, very thick-spongiose, slightly apiculate, concave, glabrous within, puberulous externally. *Hypanthium* 2–3 mm. long on a stipe 2–3.5 mm. long, both densely clavate-puberulous. *Sepals* four, 5.5–8 mm. long, 2–4 mm. wide, oblong, elliptic or lanceolate, coriaceous, glabrous within, densely puberulous externally, ciliolate. *Petal* blade 5–8 mm. long, 5–7 mm. wide, orbicular, the claw non-auriculate, 3–5 mm. long, pilosulose at the base externally, ciliolate basally, villose within on the claw and up through the center of the blade. *Filaments* 14–15 mm. long, villosulose in the basal part. *Stigma* simple or slightly enlarged. *Style* 10–13 mm. long, minutely puberulous basally. *Ovary* 3–4.5 mm. long, 1.5–2 mm. wide, oblong, densely clavate-puberulous on all surfaces, 2–3-ovulate; gynophore 3–4.5 mm. long, clavate-puberulous, inserted at any level from midway to the apex of the adaxial hypanthial wall. *Fruit* (submature) 12.5–13 cm. long, 5.5–6 cm. wide, oblong or oblanceolate, the adaxial margins subalate to alate, densely golden-clavate-puberulous, the carpophores 10–12 mm. long, clavate-puberulous.

LECTOTYPE: *F. Sellow s.n.*, "inter Victoria et Bahia" (fide the original description), Bahia, Brazil (deposited K). The selection of a lectotype is necessary because the holotype was destroyed by fire at the Berlin Herbarium during the last war. The specimen selected was considered to be a duplicate of the original type collection.

Additional Specimens: BRAZIL: Bahia, 1832, *Blanchet 88* (P), *1039, 1995* (BM, G); Ilheos, prov. Bahia, 1832, *Blanchet 2362* (G, NY, P); Bahia, Sept. 1839, *Blanchet 3087a* (G), *3088a* (G, W); Bahia, *Bondar 2165* (F); Bahia, *Bondar s.n.* (F); Ilheos, 1839, *Martius 429* (F, G, GH, MO, NY, P, W); ad ripam Itahypé, Aug. 1822, *Riedel 620* (A, NY, US); Bahia, 1830, *Salzman s.n.* (G, MO, P). Minas Geraes: 1840, *Claussen 736* (G). Without locality, *Glocker 530* (BM).

This very interesting species is known only from the isolated rain forest between Bahia and Ilheos in southern coastal Brazil. Besides its restricted range, it is easily recognizable from any of its near-relatives (*M. bifolium*, *M. angustifolium*, and *M. duckeanum*) by the thick-coriaceous or spongiose nature of the bracts, bracteoles, and sepals. Its pubescence is unique, for magnification reveals that each tiny hair is actually clavate in shape. Such pubescence clothes the inflorescence, the flower parts, and even the mature fruit.

During the preliminary phases of this study, one subspecific taxon was recognized, but the inadequacy of good material to confirm the existence of the few differences has prevented its description. The segregate group, as far as it is possible to determine from the available materials, differs in having punctate leaflets which are usually inequilaterally emarginate at the apex. The following collections exhibit these characters: *Blanchet 1039, 1995, Glocker 530,* and *Salzman s.n.*

29. **Macrolobium angustifolium** (Benth.) Cowan, comb. nov. **Figure 10.**

Vouapa angustifolia Benth. Jour. Bot. & Kew Misc. 2: 239. 1850.
Vouapa chrysostachya Miq. Hollandsche Maatsch. der Wetensch., Haarlem, Natuur. Verhand. (Stirp. Surinam. Select.), ser. 2. 7: 11. 1851.
Macrolobium chrysostachyum (Miq.) Benth. in Mart. Fl. Bras. 15(2): 220. 1870.
Macrolobium chrysostachyum (Miq.) Benth. var. *parviflora* Benth. in Mart. Fl. Bras. 15(2): 220. 1870.
Macrolobium hymenaefolium Pittier, Bol. Soc. Venez. Ci. Nat. 7: 141. 1941.

Tree 4–30 m. tall, 3–10 dm. in diameter, the branchlets densely pilosulose or less frequently glabrous. *Stipules* 7–11 mm. long, 0.5–1 mm. wide, very rarely persisting through one season, linear or linear-lanceolate. *Petioles* (4–)8–10(–15) mm. long, canaliculate, glabrous or sparsely pilosulose. *Leaflets* (6–)11(–18) cm. long, (2–)3.5(–5.5) cm. wide, falcate or subfalcate, usually lanceolate or elliptic-to oblong-lanceolate, the base inequilateral, acute, the apex acuminate or caudate-acuminate with a blunt or acute extremity, infrequently bluntly acute, usually conspicuously punctate on the lower surface, glabrous or pilose on the apical-lateral surface of the costa at the junction with the upper side of the leaflet base; costa strongly salient on the upper surface, plane to subsalient beneath, the venules obscure to prominulous. *Inflorescences* to 17.5 cm. long, averaging about 5–8 cm., the axis puberulous to flexuose-pilosulose, the peduncles to 7 mm. long; bracts (3–)5(–10) mm. long, (1.5–)3(–6) mm. wide, semipersistent or caducous, oval, orbicular, ovate, lanceolate or elliptic, acute to acuminate, strigulose within, pilosulose or puberulous externally; pedicels (1–)3(–4.5) mm. long, puberulous to pilosulose; bracteoles (5–)6(–9) mm. long, (2.5–)3(–5) mm. wide, sparsely to strongly strigulose within, puberulous to pilosulose externally, elliptic, oblong, oval, to ovate, oblanceolate or obovate, apiculate to long-acuminate. *Hypanthium* 1–2 mm. long, sessile or with a stipe to 0.5 mm. long, glabrous to puberulous. *Sepals* usually five, free or the adaxial pair more or less united, sometimes totally united

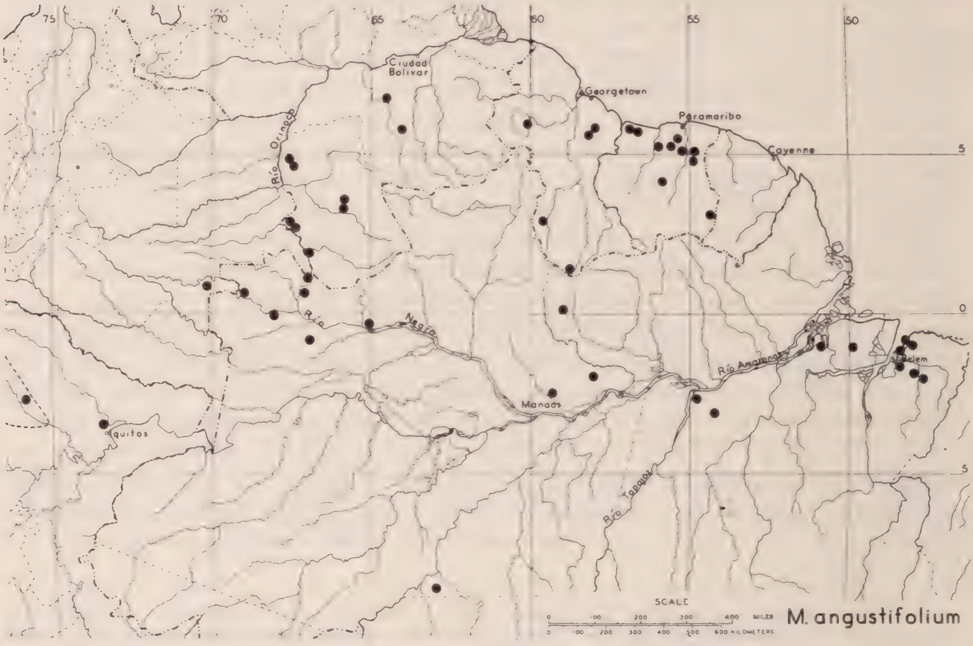

FIG. 10. Geographic distribution of *M. angustifolium.*

(then sepals four), 1–5.5 mm. long, 1–3 mm. wide, triangular-ovate, lanceolate, or oblong, acute to caudate-acuminate, glabrous or sparingly puberulous on the outer surface on the costa, sparingly ciliolate. *Petal* blade (3.5–)5(–7.5) mm. long, (4–)6(–8.5) mm. wide, usually transversely oval, infrequently suborbicular, the claw (3.5–)5(–7) mm. long, broader to distinctly auriculate basally, glabrous or pilosulose on the base externally and villosulose within up to the center of the blade, ciliolate in the basal half of the claw. *Filaments* (13–)20(–23.5) mm. long, villosulose basally. *Stigma* capitate, peltate-capitate, or infrequently capitellate. *Style* (12–)17(–22.5) mm. long, pilosulose basally. *Ovary* 1.5–3 mm. long, 1–2 mm. wide, oval, oblong, elliptic, or ovate, pilosulose on the margins, the lateral surfaces glabrous, or very rarely laterally pilosulose, 2-ovulate; gynophore 2–4 mm. long, pilosulose, inserted at the top of or midway on the hypanthium wall. *Fruit* 7–11 cm. long, 4–6 cm. wide, usually elliptic or elliptic-obovate, or ovate-elliptic, rarely oblong, glabrous or with a few marginal hairs, the carpophores 7–15 mm. long, sparingly pilosulose. *Seeds* 3–4 cm. long, 2.5–3.5 cm. wide, oval, the crustose testa more or less reticulate-venose.

Type Collection: *R. Spruce 154*, "Caripi," near Pará, Pará, Brazil, Aug. 1849 (HOLOTYPE K, isotype NY, P, W).

Additional Specimens: BRAZIL: *Burchell 9315* and *9950 (GH)*. Pará: São Miguel do Guamá, near Rios Guamá and Irituia, Aug. 1948, *Dardano & Black 48-3166* (IAN); Faro Macujubim, Sept. 1901, *Ducke 2230* (U); Rio Mapuerá, Dec. 1907, *Ducke 8972* (G); Rio Yamundá, May 1911, *Ducke 11722* (G); Rio Tapajóz, Maria Luisa, July 1923, *Ducke 16940* (U); Furos de Breves, Sept. 1901, *Guedes 2230* (G, US); Rio Capim, June 1897, *Huber 773* (G, US) and *788* (G); Aramá, Breves, March 1900, *Huber 1893* (G); Belém do Pará, June 1901, *Huber (H.J.B.R. No.) 10912* (HAMP No. 2081) (RB); Ilha do Mosqueiro, near Pará, Nov. 1929, *Killip & Smith 30480* (NY, US); Belém do Pará, Nov. 1902, *Sigueira 3004* (G); Igarapé Una, june 1923, *Snethlage 98* (F, GH, US); in vicinibus Pará, July–Aug. 1849, *Spruce s.n.* (G) (this may be an isotype). Matto Grosso: Rio Pacca Nova, affl. Rio Mamoré, Sept. 1923, *Kuhlmann 17666* (U). Amazonas: Upper Rio Negro, Ilha Nova Vida, Feb. 1944, *Baldwin 3438* (US); Rio Urubú between Lindaya and Iracema, Sept. 1941, *Ducke 802* (F, IAN, MO, NY, US); Bas Yapurá, Sept. 1904, *Ducke 6799* (G); Rio Negro, Cucuhy, Igarapé Macacuny, Sept. 1935, *Ducke 35192* (US); Rio Paduiri, Igarapé Castanha, Oct. 1947, *Froes 22519* (NY); Rio Solimões, Igarapé Belém, Dec. 1948, *Froes 23727* (IAN); Rio Tarumá, Manáos, Aug. 1949, *Froes 24980* (IAN); Rio Ipixuna, Municip. Humaytá between Monte Christo and Santa Victoria, Nov. 1934, *Krukoff 7235* (A, F, MO, NY, U, US); Rio Negro, Sept. 1828, *Riedel 1443* (A, BM, NY, US); middle Rio Negro, Vista Allegre, between mouth of Rio Curicuriary and Barcellos, Sept.–Oct. 1947, *Schultes & Lopez 8866* (US); upper Rio Negro, base of Cerro Dimiti, Rio Dimiti, May 1948, *Schultes & Lopez 9922* (US); prope Panure ad "Rio Uaupes," Oct. 1852, *Spruce 2530* (G, GH, K, P, W) (TYPE COLLECTION of *M. chrysostachyum* var. *parviflorum* Benth.).

PERU: Loreto: Gamitanacocha, Río Mazán, Jan.–Feb. 1935, *Schunke 85, 329* (F, UC, US); upper Río Amazonas, Iquitos, 1924, *Tessmann 3658* (F, G, NY).

COLOMBIA: Capeceras del Cuduyari, Vaupes, Dec. 1943, *Allen 3216* (US).

VENEZUELA: Amazonas: Río Cunucunuma, above Playa Alta, Nov. 1950, *Maguire, Cowan & Wurdack 29495* (F, G, NY), *29501* (NY, US, VEN); Río Cuao, tributary Río Sipapo, Jan. 1949, *Maguire & Politi 28151* (K, NY), *28414* (F, G, K, MO, NY, US, VEN); prope San Carlos del Río Negro, March–April, 1853, *Spruce 2330* (NY); Maroa, Río Guainia, Feb. 1942, *Williams 14403* (F, NY, US, VEN), March 1942, *14805* (F, NY, US, VEN). Bolivar: Río Tonoro, alto Río Paragua, Aug. 1943, *Cordona 813* and *825* (NY, US, VEN); Río Caura, Salto de Pará, March 1939, *Williams 11445* (UC, US, VEN) (TYPE COLLECTION of *M. hymenaefolium* Pittier).

BRITISH GUIANA: Upper Rupununi R., near Dadanawa, July 1922, *de la Cruz 1799* (F, GH, MO, NY, UC, US); Malali, Demerara R., Oct.–Nov. 1922, *de la Cruz 2643* (F, GH, MO, NY, US); Kamakusa on upper Mazaruni R., Nov. 1922, *de la Cruz 2826a* (GH); Kurupung, upper Mazaruni R., Nov. 1922, *Leng 206* (NY); Kurupung, Tacoba, Nov. 1922, *Lang & Persaud 206* (F); Bootooba, June 1924, *Persaud 34* (F, NY, UC); Bootooba, Demerara R., March 1923, *Persaud 36* (F); Basin of Essequibo R., near mouth of Onoro Creek, Dec. 1937, *A. C. Smith 2698* (A, F, G, MO, NY, U, US, Y).

SURINAM: Pará R., Oct. 1909, *Boldingh 3832* (U); La Prospertu, *Focke 986* (GH, U) (TYPE COLLECTION of *Vouapa chrysostachya* Miq.); fluv. Nickerie, *Fulleken 410* (U);

Litanie, Feti Creek, Aug. 1939, *Geyskes 101* (U); Coppename R., bover Fonchensvallen, Oct. 1943, *Geyskes 978* (U); prope Republiek, Jan. 1911, *Gonggrypp 78* (U); prope Republiek, Aug. 1910, *Gonggrypp s.n.* (U); fluv. Couropina, prope Republiek, Aug. 1911, *Gonggrypp s.n.* (U); *Herb. Surinam 6410* (U); prope Republiek, Oct. 1911, *Kuyper 63* (U); near Posoegronoe, Saramacca R., June 1944, *Maguire 24016* (F, MO, NY, U, US); Toekoemoetoe Creek, Saramacca R., Oct. 1944, *Maguire 24910* (F, MO, NY, U, US); Litanie R., Aug. 1937, *Rombouts 723* (IAN, U); *Splitgerber 81* (P); Litanie, Aug. 1939, *Stahel 101* (NY); Akwansa, Nickerie, Sept. 1916, *Stahel & Gonggrypp 3539* (U, US); Zanderij I, July 1915, *Sur. For. Bur. 761* (U); Zanderij I, Nov. 1915, *Sur. For. Bur. 1383* (U); Zanderij I, Jan. 1916, *Sur. For. Bur. 1565* (U); Watramiri, May 1916, *Sur. For. Bur. 1914* (U); Zanderij I, Aug. 1918, *Sur. For. Bur. 3924* (MO, U); Zanderij I, Nov. 1918, *Sur. For. Bur. 4074* (U); Zanderij I, Sept. 1920, *Sur. For. Bur. 4769* (U); Zanderij I, *Sur. For. Bur. 6410* (U); Zanderij I, Aug. 1924, *Sur. For. Bur. 6472* (MO, U); Zanderij I, May 1944, *Sur. Woodherb. 202* (IAN, NY, U, Y); fluv. Pikien, Aug. 1900, *Tresling 260* (U); Surinam, *Weigelt s.n.; Wullschlagel 819* (W); Rio Para, Sept. 1853, *Wullschlagel 1435, 1436, 1437* (W).

FRENCH GUIANA: Guyane, 1821, *Perrottet s.n.* (P).

Vernacular Names: Brazil: "arapary", "ipe". Peru: "machinmango", "soliman". Surinam: "sarabebe", "watrabirihoedoe", "witte walaba".

There is in this species a very considerable degree of variability but it appears to have no taxonomic significance and certainly no discernible pattern. This situation is rather characteristic of many of the commonly collected, widespread species in the genus. Within these species geographic races may have already arisen but their divergence at this time is insufficient for their taxonomic recognition.

The relationship of this species is surely with *M. bifolium*, with which it has frequently been confused in the past. They are readily separable on the following characters of *M. angustifolium*: (1) ovary pilosulose only on the margins; (2) much larger bracts of different shape; (3) bracts and bracteoles pubescent on the inner surface; (4) costa of leaflets strongly salient on the upper surface.

The replacement of the familiar name of this species by one which is either unknown or poorly known to others may distress those who maintain the sanctity of the well-established epithet. However, the modification is entirely in line with the spirit and letter of the International Code which provides that the earliest epithet shall be the correct one. It has been found that the correct date on Miquel's *Stirpes surinamensis selectae* is really 1851 rather than 1850 as has most frequently been cited. Apparently, the author completed the manuscript in 1850; the introduction is dated January 1850, and his title page bears that date. However, the seventh volume of the second series of the journal cited, which is entirely occupied by Miquel's paper, bears the date 1851. J. K. Hasskarl reviewed the work in Flora (34: 190. 28 March 1851.) and he stated there that the publication was received "this week" ("...eines in dieser woche...herausgegebenen Bandes"). This evidence would then establish that the publication in question was published in 1851 during the week of March 28th or possibly somewhat earlier in the year. Consequently, the next available epithet is Bentham's *Vouapa angustifolia*.

30. **Macrolobium retusum** Huber, Bol. Mus. Goeldi 7: 290. 1913.

Tall shrub with glabrous leaves and branchlets. *Petioles* 5–8 mm. long, shallowly canaliculate. *Leaflets* 8.5–10.5 cm. long, 5–6.5 cm. wide, obovate-oval, the base inequilateral, the upper side obtuse, the lower acute, the apex rotund, deeply emarginate; costa salient on both sides, the venules closely parallel, prominulous, an intramarginal nerve traversing the length of each margin. *Inflorescences* 4 cm. long, the axis puberulous; bracts minute, caducous; pedicels about 1 mm. long, puberulous; bracteoles 7.5 mm. long, 3–3.5 mm. wide, oval-oblong, abruptly caudate-acuminate, sparingly strigulose within, puberulous externally. *Hypanthium* 1.5 mm. long, sessile, glabrous. *Sepals* five, free, the adaxial pair 1 mm. long, 0.5 mm. wide, triangular, acuminate, ciliolate apically, the other sepals 2.5–3 mm. long, 1–1.5 mm. wide, lanceolate, acuminate, ciliolate apically. *Petal* blade 3 mm.

long, 4 mm. wide, oval transversely, the claw 7 mm. long, alate but not distinctly auriculate, glabrous externally, sparingly villosulose within on the claw. *Filaments* 15 mm. long, sparsely villose basally. *Stigma* capitellate. *Style* about 12 mm. long, pilose basally. Ovary 2 mm. long, 1 mm. wide, oblong, pilose marginally, the lateral surfaces glabrous, 3-ovulate; gynophore 1.5 mm. long, pilosulose, inserted at the apex of the hypanthium. *Fruit* unknown.

Type Collection: *A. Ducke (H.A.M.P. No.) 12294*, "Cerro de Cupati, Río Japura (Caqueta)," Colombia, Nov. 1912 (isotype G).

There are apparently no very intimate bonds of relationship between this species and any of the others of the genus. It has, rather arbitrarily, been placed near the *M. bifolium*-*M. angustifolium* line for lack of a better disposition. It is one of the more distinct species in this section and may be recognized quite readily by the shape of its leaflets, which have deeply emarginate apices, well-developed intramarginal nerves, and closely parallel, prominulous venules.

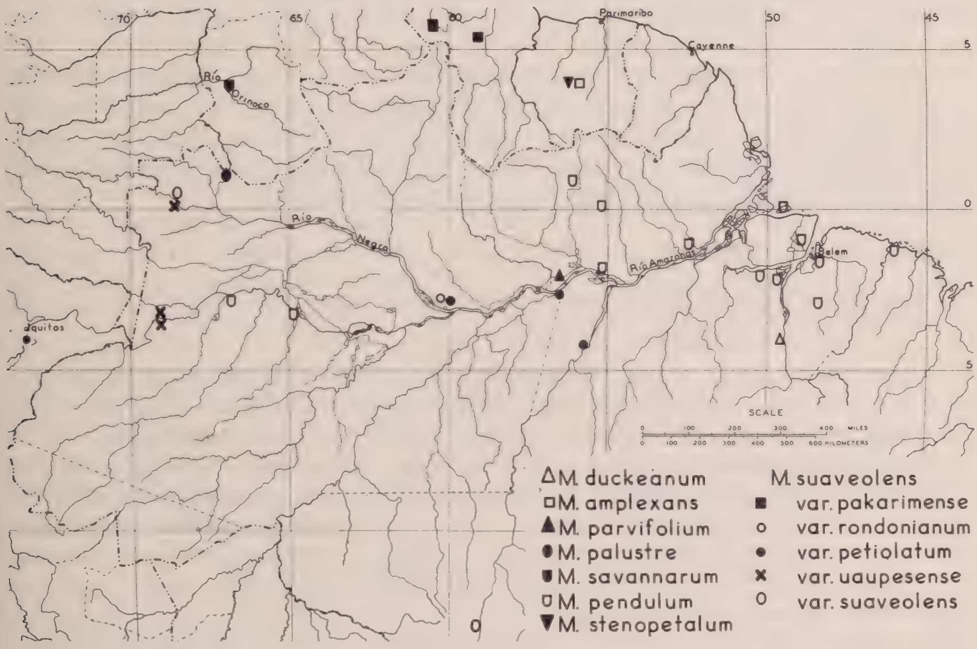
70
65
Río Orinoco
Paramaribo
50
45
5
Cayenne
0
Río Negro
Río Amazonas
Belem
Iquitos
5
SCALE
0 100 200 300 400 MILES
0 100 200 300 400 500 600 KILOMETERS
△ M. duckeanum
□ M. amplexans
▲ M. parvifolium
● M. palustre
■ M. savannarum
▯ M. pendulum
▼ M. stenopetalum
M. suaveolens
■ var. pakarimense
○ var. rondonianum
● var. petiolatum
× var. uaupesense
O var. suaveolens

FIG. 11. Geographic distribution of several species of *Macrolobium*.

31. Macrolobium duckeanum Cowan, sp. nov. Figure 11.

Arbor(?), ramulis foliisque glabris. Petiolus 10–15 mm. longus, canaliculatus, glaber. Foliola 8.5–11.5 cm. longa, 4–6 cm. lata, valdissime inaequilateralia, arcuata, elliptica, basis inferiore latere auriculato, superiore acuto, ad apicem acuta et extremitate acuta vel obtusa, saepe inaequilaterali; costa saliens, venuli conspicui. Inflorescentiae 3.5–7 cm. longae, axe dense puberulo, pedunculo 2–5 mm. longo; bracteis 2.5 mm. longis, 1.5 mm. latis, caducis, oblongo-ovatis, intus glabris, extus dense puberulis; pedicelli 2.5 mm. longi, dense puberuli; bracteolis 6 mm. longis, 3–4.5 mm. latis, oblongis vel ovalibus, concavis, apiculatis, intus glabris, extus dense puberulis. Hypanthium 2 mm. longum, sessile, glabrum. Sepala quinque, duobus adaxilibus fere omnino conjugentibus, 4.5–5 mm. longa, 1.5–2.5 mm. lata, oblonga, vel ovalia, acuta, concava, irregulariter ciliolata. Petali lamina 5.5 mm. longa, 8 mm. lata, transverse ovalis, unguicilo late alato, petala ad basim ciliolata et extus pilosula, intus pilosa in unguicilo. Filamenta 11.5–15.5 mm. longa, ad basim villosa. Stigma capitellatum. Stylus 17.5 mm. longus, ad basim puberulus. Ovarium 2 mm. longum, 1 mm. latum, oblongum, puberulum, 2-ovulatum, gynophoro 2 mm. longo, puberulo. Fructus (senes valvae solum) circa 10.5 cm. longus, 4 cm. latus, oblongus, alis angustis, carpophorum 8 mm. longum, minute puberulum. Semina 2.5 cm. longa, 2 cm. lata, ovalia, plana, testa tenuicoriacea, plus minusve venosa.

Type Collection: *A. Ducke 15605*, "chemin de fer d'Alcobaca, Tocantins, Campina d'Arumatéua," State of Pará, Brazil, Jan. 1915 (HOLOTYPE US, isotype G). Known only by the type collection.

It is with the greatest pleasure that this species is named for Dr. Adolpho Ducke, who has contributed so richly to the knowledge of the flora of northeastern South America by his extensive collections and voluminous writings. He has described a large number of species of *Macrolobium* and his synopsis of the genus in the Amazonian Hyalea was quite well done. It is fitting, then, that his name be perpetuated in a species of a genus to which he has given so much of his time and energy.

The collection cited was identified as *M. bifolium* when received for this study. While this is the closest relative of the new species, the latter is readily recognizable by the rotund-auriculate lower side of the leaflet base, its puberulous rather than papillate-puberulous ovary, its transversely oval petal blade, and its minutely puberulous rather than papillate-puberulous fruit.

32. Macrolobium amplexans (Amshoff) Cowan, comb. nov. **Figure 11.**

Macrolobium bifolium (Aubl.) Pers. var. *amplexans* Amsh. Bull. Torrey Club 75: 388. 1948.

Tree to 40 m. tall, 1 m. in diameter, the branchlets very minutely puberulous. *Petioles* 8–13 mm. long, canaliculate, very minutely puberulous. *Leaflets* 8.5–17 cm. long, 3–7.5 cm. wide, arcuate, oblong-elliptic, the base inequilateral, acute, the lower side decurrent, the apex truncate-acute, epunctate, minutely puberulous at the base on the upper surface, glabrous beneath; costa plane above, salient beneath, the venules prominulous above, prominent beneath. *Inflorescences* 3.5–7 cm. long, ramiflorous, the axis minutely puberulous, the peduncles about 2 mm. long; bracts 1 mm. long and wide, triangular, ciliolate, glabrous on the inner surface, minutely puberulous externally; pedicels 2–5 mm. long; bracteoles 6 mm. long, 4 mm. wide, oblong-oval, slightly apiculate, glabrous within, minutely puberulous externally. *Hypanthium* 1.5 mm. long, glabrous. *Sepals* four, 3–4 mm. long, 2.5 mm. wide, oval to oblong, obtuse, glabrous. *Petal* blade 6 mm. long, 7 mm. wide, about orbicular, the claw 4 mm. long, very strongly auriculate basally, the auricles pilosulose externally and ciliolate, villose within on the claw and up to the center of the blade. *Filaments* villose over most of the surface. *Stigma* peltate. *Style* about 15 mm. long, very minutely puberulous basally. *Ovary* 3 mm. long, 1.5 mm. wide, oblong, minutely puberulous on all surfaces, 2-ovulate, the gynophore 3 mm. long, minutely puberulous, inserted midway on the adaxial wall of the hypanthium. *Fruit* unknown.

Type Collection: *B. Maguire 24308*, "high bush north of Savanna I, Tafelberg, Surinam," Aug. 1944 (HOLOTYPE NY, isotypes F, G, MO, U, US). Known only by the type collection.

Miss Amshoff in describing this group as a variety of *M. bifolium* was certainly not far afield, for in many respects obvious similarities do exist. However, it is held that there are ample characters of sufficient magnitude and importance for its elevation to specific rank.

The inflorescences of *M. amplexans* are ramiflorous and are minutely puberulous with simple hairs, whereas those of *M. bifolium* are borne principally on the current year's branchlets and are densely puberulous with ribbon-like hairs. Further, the flowers of the latter are typically densely congested, but in *M. amplexans* they are distant. Also the costa of the leaflets in the latter is not sulcate on the upper surface as it is in *M. bifolium* nor are the venules prominent on the upper surface of the leaflets.

33. **Macrolobium suaveolens** Spruce ex Benth. in Mart. Fl. Bras. 15(2): 219. 1870. **Figure 11.**

Tree to 13 m. tall, the branchlets usually glabrous, rarely pilosulose or minutely puberulous. *Petioles* glabrous or minutely puberulous, sulcate to canaliculate. *Leaflets* 7–14 cm. long, 3–5.5 cm. wide, arcuate to falcate, elliptic, the base inequilateral, acute, the apex acute to acuminate, the extremity acute to obtuse; lower surface punctate or epunctate, glabrous, upper surface glabrous or puberulous on the costa and base; costa plane to salient, the venules obscure to prominent. *Inflorescences* 2–8 cm. long, the axis minutely puberulous, the peduncles 1–3 mm. long; bracts 1–1.5 mm. long and wide, triangular or ovate, acute or acuminate, ciliolate, glabrous or infrequently minutely puberulous on the outer surface; pedicels 1–4.5 mm. long, sparsely puberulous or glabrous; bracteoles 5–6.5 mm. long, 2.5–4 mm. wide, oblong or oval, glabrous within or sparingly pilose, minutely puberulous externally, at least at the apex. *Hypanthium* 1–2 mm. long, on a stipe to 1 mm. long or sessile, glabrous or sparsely puberulous. *Sepals* five, free or infrequently the adaxial pair partly united, 1–4 mm. long, 0.5–1.5 mm. wide, lanceolate, linear-lanceolate, oblong or elliptic, or when strongly dimorphic, the adaxial pair triangular and smaller, glabrous or ciliolate near the apex. *Petal* blade 3–7 mm. long, 3.5–7 mm. wide, orbicular to transversely oval, the claw 4–6 mm. long, wider at the base to definitely auriculate, pilose externally toward the base, the claw more or less ciliolate, glabrous within or sparingly villose. *Filaments* 15.5–21 mm. long, villose or villosulose in the basal portion. *Stigma* capitellate, capitate, or peltate. *Style* 10–22 mm. long, glabrous or more often puberulous basally. *Ovary* 1–2.5 mm. long, 1–1.5 mm. wide, oblong or oval, glabrous to minutely puberulous, 2–3-ovulate; gynophore 2–3.5 mm. long, minutely puberulous or pilosulose. *Fruit* unknown.

Key to the Varieties of *Macrolobium suaveolens*

1. Ovary glabrous, adaxial surface of gynophore pilosulose; leaflets with upper margin about straight, lower margin arcuate. .... 33e. var. *suaveolens*.
1. Ovary minutely puberulous on all surfaces or only on margins with lateral surfaces glabrous; both margins of leaflets arcuate. .... 2.
2. Ovary puberulous on all surfaces. .... 3.
2. Ovary puberulous only on margins. .... 4.
3. Leaflets epunctate on lower surface, minute-puberulous above at base and on most of length of strongly salient costa, petioles densely minutely puberulous. Potaro River region of central British Guiana. .... 33a. var. *pakarimense*.
3. Leaflets punctate on lower surface, glabrous, costa plane to salient on upper surface, petioles glabrous. Central Brazil. .... 33b. var. *rondonianum*.
4. Bracteoles more or less pilose within; petioles mostly 7–13 mm. long. .... 33c. var. *petiolatum*.
4. Bracteoles glabrous on inner surface; petioles 3.5–6 mm. long. 33d. var. *uaupesense*.

33a. **Macrolobium suaveolens var. pakarimense** Cowan, var. nov. **Figure 11.**

Arbor 10–13 m. alta, 15 cm. diametro, ramulis minute puberulis. Petiolus 4–6 mm. longus, leviter sulcatus, valde minuto-puberulus. Foliola 7–9.5 cm. longa, 3–4 cm. lata, arcuata, ad apicem abrupte acuta, extremitate obtusa vel acuta, supra in costa minute puberula, infra glabra, costa valde salienti supra, infra plana, venulis subprominulis. Inflorescentiae ad 5 cm. longae; pedicello 2.5–4 mm. longo; bracteolis 5.5 mm. longis, 3 mm. latis, oblongis, intus glabris, extus minuto-puberulis, obtusis et parce apiculatis. Sepala quinque, dúobus adaxilibus partim conjunctis, 3.5–4 mm. longa, 1–1.5 mm. lata, lanceolata vel lineari-lanceolata, ad apicem sparse ciliolata. Petali lamina circa 7 mm. diametro, orbicularis, unguicilo 4–5 mm. longo, auriculato. Stylus 14–15 mm. longus, basim versus puberulus. Ovarium 2 mm. longum, 1 mm. latum, ubique minuto-puberulum, gynophoro 3.5 mm. longo, minuto-puberulo.

Type Collection: *B. Maguire & D. B. Fanshawe 32210*, "margin of Imbaimadai Savanna, Upper Mazaruni River, Pakarima Mts., 550 m. alt., British Guiana," Oct. 1951 (HOLOTYPE NY, isotypes F, G, GH, K, MO, U, US, VEN).

Additional Specimens: Bartica-Potaro Road, 107 m., Nov. 1943, *Fanshawe 1470* (Forestry Dept. 4206) (BGF).

33b. **Macrolobium suaveolens** var. **rondonianum** (Hoehne) Cowan, comb. nov. **Figure 11.**

Macrolobium Rondonianum Hoehne, Comm. Linh. Teleg. Ann. 5, Bot. pt. 8: 32. 1919.

Tree with glabrous branchlets and leaves. *Petioles* 4–5 mm. long. *Leaflets* 9.5–13 cm. long, 3.5–5 cm. wide, arcuate, acute to long-acuminate, the extremity usually obtuse, punctate on the lower surface, the venules prominulous above, prominulous to prominent beneath. *Inflorescences* 2–4.5 cm. long; bracts triangular, acute, glabrous except for the ciliolate margins or very minutely puberulous externally; pedicels 1–2.5 mm. long, glabrous or sparsely and minutely puberulous; bracteoles 5.5–6 mm. long, 2.5–3.5 mm. wide, oblong, glabrous within, sparsely and minutely puberulous outside, at least near the apex. *Sepals* 1.5–3 mm. long, 0.5–1.5 mm. wide, more or less ciliolate. *Petal* blade 3–4.5 mm. long, 3.5–4.5 mm. wide, transversely oval, the claw 4–4.5 mm. long, exauriculate. *Filaments* 17–17.5 mm. long, sparsely villose basally. *Stigma* capitellate to capitate. *Style* 14.5 mm. long, basally minutely puberulous. *Ovary* 2 mm. long, 1–1.5 mm. wide, minutely puberulous on all surfaces, the gynophore 2.5 mm. long, minutely puberulous.

Specimens Examined: BRAZIL: Amazonas: Estrada do Aleixo, Manáos, May 1937, *Ducke 489* (A, F, MO, NY, US); same data, *Ducke 35195* (U, US); Rio Uaupés, Taraqua, Nov. 1947, *Pires 984* (IAN); Rio Uaupés, Panure, Nov. 1947, *Pires 1077* (IAN).

Although no authentic material of Hoehne's species has been examined, it appears probable from his published plate and description that his species is identical with this variety. Accordingly the epithet is retained in a new combination. The type material is probably at the Museo Goeldi but material of this genus has not been received from that institution.

33c. **Macrolobium suaveolens** var. **petiolatum** Cowan, var. nov. **Figure 11.**

Arbor mediocris 10 m. alta, ramulis foliisque glabris. Petiola 7–13 mm. longa, canaliculata. Foliola 8–14 cm. longa, 2.5–5.5 cm. lata, arcuata ad falcata, ad apicem acuminata vel acuta et extremitate acuta vel obtusa, punctata vel epunctata, costa valdissime salienti supra, infra plana ad subsalienti, venulis prominulis ad prominentibus. Inflorescentiae 3.5–8 cm. longae, pedunculo 1.5–3 mm. longo; bracteis 1–1.5 mm. longis et latis, triangularibus, glabris, marginibus ciliolatis exceptis; pedicelli 2–4.5 mm. longi, minute puberuli; bracteolis 5–6.5 mm. longis, 3–4 mm. latis, oblongis vel ovalibus, plus minusve pilosis intus, extus puberulis. Sepala adaxilia 1.5–2 mm. longa, 1 mm. lata, triangularia, cetera 2.5–3.5 mm. longa, 1–2 mm. lata, lanceolata ad oblonga, acuta vel acuminata, plus minusve ciliolata vel glabra. Petali lamina 3.5–5.5 mm. longa, 4–5.5 mm. lata, orbicularis vel transverse ovalis, unguicilo 4–6 mm. longo. Filamenta 15.5–18 mm. longa, villosa basim versus. Stigma capitellatum ad peltatum. Stylus 10–16 mm.

longus, glaber vel basim versus puberulus. Ovarium 1.5–2.5 mm. longum, 1–1.5 mm. latum, oblongum, marginibus minute puberulis, lateribus glabris, 2–3-ovulatum, gynophoro 2–3.5 mm. longo, minute puberulo.

Type Collection: *A. Ducke 35194*, "silva terris altis ad meridiem Paraná do Ramos, Parintins," Amazonas, Brazil, Jan. 1936 (HOLOTYPE US, isotype G, U).

Additional Specimens: Rio Tarumá, Manáos, Amazonas, Brazil, Jan. 1941, *Ducke 1012* (IAN, NY, US); Bella Vista, Rio Tapajóz, Pará, Brazil, Jan. 1918, *Ducke 10913* (H.A.M.P. No. 16912) (G, P, U, US); Mishuyacu, near Iquitos, Dept. Loreto, Peru, Dec. 1929, *Klug 717* (F, NY, US).

There is but slight variability in the aspect of the specimens cited above, but *Ducke 1012* shows several characteristics which are at definite variance with the rest of the material. In spite of this it is assigned here, but its characters are not incorporated in the description. It has pilosulose branchlets, shorter petioles, and longer adaxial sepals.

33d. Macrolobium suaveolens var. uaupesense Cowan, var. nov. **Figure 11.**

Arbor parva, ramulis glabris. Petiolus 3.5–6 mm. longus, glaber. Foliola 8–14 cm. longa, 3–5 cm. lata, subfalcata ad falcata, ad apicem abrupte acuminata vel longo-acuminata, glabra, costa subsalienti, venulis obscuris ad subprominulis. Inflorescentiae 2–4 cm. longae, pedunculo circa 1.5 mm. longo; bracteis caducis, circa 1 mm. longis, 1 mm. latis, triangularibus; pedicelli 2–2.5 mm. longi; bracteolis 5–6 mm. longis, 3–4 mm. latis, oblongis vel ovalibus, ad apicem rotundatis apiculatisque, glabris intus, extus minuto-puberulis. Sepala adaxilia 1–2 mm. longa, 0.5–1 mm. lata, triangularia, acuta vel acuminata, cetera 2.5–3.5 mm. longa, 1–1.5 mm. lata, lanceolata vel elliptica, acuta, glabra vel ad apicem ciliolata. Petali lamina 3.5–5.5 mm. longa, 5–6.5 mm. lata, transverse ovalis vel suborbicularis, unguicilo 4–7 mm. longo, nonnihil auriculato. Filamenta 19.5–21 mm. longa. Stigma capitellatum. Stylus 16.5–22 mm. longus, glaber vel ad basim puberulus. Ovarium 1.5–2.5 mm. longum, 1 mm. latum, oblongum, 2-ovulatum, marginibus puberulis, lateraliter glabris, gynophoro 2–2.5 mm. longo, minute puberulo.

Type Collection: *R. Schultes & J. Pires 9069*, "Taracuá, Igarapé da Chuva, Rio Vaupés between Ipanore and confluence of Rio Negro, Amazonas," Brazil, Nov. 1947 (HOLOTYPE US).

Additional Specimens: BRAZIL: Amazonas: São Paulo de Olivença, Rio Solimões, Nov. 1940, *Ducke 358* (Y) and Oct. 1931, *Ducke 24065* (RB, US); Rio Uaupés, Taraqua, Nov. 1947, *Pires 995* (IAN).

33e. Macrolobium suaveolens var. suaveolens. Figure 11.

Vouapa suaveolens (Spruce ex Benth.) Taub. Bot. Centralbl. 47: 394. 1891.
Vuapa suaveolens (Spruce ex Benth.) Kuntze, Rev. Gen. 1: 213. 1891.

Shrub to 5 m. tall or small tree, the branchlets and leaves glabrous. *Petioles* 5–6 mm. long. *Leaflets* 8–11.5 cm. long, 3–4 cm. wide, falcate, the apex acuminate with the extremity obtuse, the upper margin nearly straight, the lower arcuate; costa plane above, salient beneath, the venules prominulous. *Inflorescences* 4.5–6.5 cm. long, the peduncle about 1 mm. long; bracts 1.5 mm. long, 1 mm. wide, ovate, acuminate, glabrous except for the ciliolate margins; pedicels 1–3.5 mm. long, sparsely and minutely puberulous; bracteoles 5–6 mm. long, 3–3.5 mm. wide, oblong, minutely apiculate, glabrous within, externally minutely puberulous at least on the apex and costa. *Sepals* dimorphic, the adaxial ones 1–1.5 mm. long, about 1 mm. wide, triangular, acute, the others 2.5 mm. long, 1.5 mm. wide, oblong-lanceolate, acute, glabrous. *Petal* blade about 4 mm. in diameter, orbicular, the claw 4 mm. long, broader at the base but not auriculate. *Filaments* 16 mm. long. *Stigma* peltate. *Style* 11 mm. long, glabrous. *Ovary* 2 mm. long, 1 mm. wide, glabrous, oblong, the gynophore 2.5 mm. long, pilosulose on the adaxial surface.

Type Collection: *R. Spruce 2771*, "In sylvis 'Caatingas'...fluv. Uaupés," Brazil, Nov. 1852 (HOLOTYPE K, isotypes F, G, GH, NY, P, W).

Additional Specimens: Rio Negro, Vila Içana, April 1947, *Pires 450* (IAN).

The relationships of this species are not particularly well defined but it is perhaps more nearly related to *M. amplexans* than to any other species. It may be distinguished by its minutely puberulous branchlets, ramiflorous inflorescences, and four-parted calyx.

The prime character utilized in segregating the varieties is the distribution of the pubescence on the ovary. The ovary of varieties *pakarimense* and *rondonianum* is puberulous on all surfaces, while that of varieties *petiolatum* and *uaupesense* is puberulous only on the margins, and the ovary of the typical variety is completely glabrous.

34. **Macrolobium parvifolium** (Huber) Cowan, **comb. nov. Figure 11.**

Macrolobium suaveolens Spruce ex Benth. var. *parvifolium* Huber, Bol. Mus. Goeldi 5: 389. 1909.

Small shrub, the branchlets minutely puberulous. *Petioles* circa 4 mm. long, canaliculate, glabrous. *Leaflets* 4–7 cm. long, 1.5–2.5 cm. wide, glabrous, epunctate, inequilateral, arcuate, oval-elliptic or lanceolate, the base inequilateral, subobtuse, the lower side rotund, the apex abruptly or evenly acute, the extremity obtuse or acute; costa subsalient, the venules obscure. *Inflorescence* 4–14 cm. long, the axis minutely puberulous with the basal portion invested by closely imbricate, persistent, sterile bracts; bracts 2 mm. long, 1–2 mm. wide, ovate, ciliolate, glabrous within, minutely puberulous externally; bracteoles 4.5 mm. long, 2.5 mm. wide, oblong, apiculate, glabrous within, minutely puberulous externally. *Hypanthium* 1 mm. long, glabrous, sessile. *Sepals* five, free, glabrous, the adaxial pair 0.5–1 mm. long, 0.5–0.7 mm. wide, triangular, acute, the others 2.5–3 mm. long, 1–1.5 mm. wide, lanceolate, acute, or acuminate. *Petal* blade 4.5 mm. long, 6 mm. wide, transversely oval, the claw 2.5 mm. long, auriculate, pilosulose externally and ciliolate on the auricles, sparsely villosulose within on the claw and up to the center of the blade. *Filaments* 11.5 mm. long, villose in the basal part. *Stigma* capitate. *Style* 12 mm. long, glabrous. *Ovary* 2 mm. long, 1 mm. wide, oblong, glabrous, 2-ovulate, the gynophore 2 mm. long, glabrous. *Fruit* unknown.

Type Collection: *A. Ducke 8497*, "campos a E. de Faro," Pará, Brazil, July 1907 (HOLOTYPE presumably at Museo Goeldi, isotypes F-frag., G, US). Material of this genus has not been received for study from the Museo Goeldi.

Additional Specimens: Faro, Pará, Brazil, May 1911, *Ducke 11697* (G).

Macrolobium parvifolium was originally described as a variety of *M. suaveolens*, to which it is undoubtedly rather closely allied, but there are so many differences that it deserves specific recognition. The most striking feature of the plant is the densely bracteate base of the inflorescence axis, and it is this characteristic which most readily separates it from any part of *M. suaveolens*, as well as from other species. Its glabrous ovary distinguishes it from all the varieties of *M. suaveolens* except the typical one. Its leaflet shape and size, glabrous gynophore, and shape of the petal blade serve to differentiate it from the latter.

35. **Macrolobium palustre Ducke**, Arch. Inst. Biol. Veg. Rio de Janeiro 4: 13. 1938. **Figure 11.**

Small tree, the branchlets glabrous. *Leaves* unijugate to bijugate; the petioles 13–18 mm. long, canaliculate; rachis 0–22 mm. long, canaliculate, glabrous. *Leaflets* 6.5–9.5 cm. long, 3–4 cm. wide, glabrous, epunctate, slightly arcuate, elliptic, the base inequilateral, acute, the apex acute with a rounded-truncate extremity; costa subimpressed on the upper surface, salient beneath, the venules prominent. *Inflorescences* to 7 cm. long, glabrous, the peduncles 5-6 mm. long; pedicels 6-8 mm. long, glabrous; bracteoles 10-11 mm. long, 5 mm. wide, oblong and cuspidate or elliptic and acute, glabrous, coriaceous. *Hypanthium* 2 mm. long on a stipe about 1 mm. long, glabrous. *Sepals* four, 7-8 mm. long, 2.5-3 mm. wide, lanceolate or oblong-lanceolate, acute, slightly concave, ciliolate in the apical portion. *Petal* blade 6 mm. long, 7.5 mm. wide, transversely oval, the claw 5-6 mm. long, auriculate basally, glabrous externally, ciliolate on the lower portion of the claw, villose within on the claw and up to the center of the blade. *Filaments* 16.5 mm. long, villose basally. *Stigma* capitate. *Style* 13 mm. long, glabrous. *Ovary* 2.5 mm. long, 1.5 mm. wide, oblong, glabrous, 1-2-ovulate, the gynophore 2.5-3 mm. long, glabrous, inserted midway on the adaxial hypanthial wall. *Fruit* unknown.

Type Collection: *A. Ducke (H.J.B.R. No.) 35193*, "Igarapé Macacury, Rio Negro, Cucuhy," Amazonas, Brazil, September 1935 (HOLOTYPE RB, isotypes G, P, U, US).

Macrolobium palustre is obviously related to *M. pendulum* but differs in so many characters, both quantitative and qualitative, that it has been regarded as specifically distinct, although the first reaction was to treat it as a variety within *M. pendulum*. In addition to differing by the frequent occurrence of bijugate leaves, *M. palustre* has caducous stipules, longer petioles, longer sepals and petal claw, and basally villose filaments. Also, whereas *M. pendulum* is distributed along the lower basin of the Amazon River, this species is known only from the upper Rio Negro region.

36. **Macrolobium savannarum** Cowan, sp. nov. Figure 11.

Arbuscula ad 1 m. alta, ramulis minute et sparse puberulis. Stipulae caducae, 2 mm. longae, 0.5 mm. latae, subulatae, acuminatae, sparsissime ciliolatae. Petiolus 1.5-4 mm. longus, minute puberulus. Foliola 1.5-5.5 cm. longa, 1-2.5 cm. lata, inaequilateraliter subfalcato-elliptica, ad basim inaequilateralia, latere inferiore obtuso sed superiore acuto, ad apicem acuta et extremitate obtusa, glabra, epunctata; costa leviter salienti, venulis utroque conspicuis. Inflorescentiae 1.5-3 cm. longae, glabrae, pedunculo 1-2 mm. longo; bracteis caducis; pedicellis 5-15 mm. longis, glabris; bracteoli 9-11 mm. longi, 4-7 mm. lati, oblongi, obovati vel oblongo-obovati, glabri, apiculati, intus carnosissimi. Hypanthium 1.5-2 mm. longum, glabrum. Sepala quattuor, 4-8 mm. longa, 1.5-4 mm. lata, oblonga vel lanceolata, ad apicem eroso-dentata, glabra. Petali lamina 6-7.5 mm. longa, 6.5 mm. lata, orbicularis, unguiculo 5-8 mm. longo, alato, haud auriculato; 1-4 petalodia 4-7.5 mm. longa, linearia vel lineari-oblanceolata. Filamenta 13.5-15.5 mm. longa, glabra. Stigma capitellatum. Stylus 10-13.5 mm. longus, glaber. Ovarium 2-2.5 mm. longum, 1-1.5 mm. latum, oblongum, glabrum, (2-)3-ovulatum, gynophoro 2-2.5 mm. longo, glabro. Fructus ignotus.

Type Collection: *B. Maguire, R. Cowan, & J. Wurdack 30540*, "Yapacana Savanna, base of Cerro Yapacana, Río Orinoco," Amazonas, Venezuela, Jan. 1951 (HOLOTYPE NY, isotypes F, G, K, MO, U, US).

Additional Specimens: Same data, *Maguire, Cowan & Wurdack 30505* (IAN, NY, VEN).

This new species is most nearly related to *M. pendulum* but there are several very distinct differences separating them. *M. savannarum* has caducous stipules, epunctate leaflets, and it is a low shrub of southwestern Venezuela. *M. pendulum* has persistent stipules, often punctate leaflets, and it is a tree 8-20 m. tall in the Amazon Delta region and southern Amazonas in Brazil.

This species was the dominant shrub in the open wet savanna where it was growing but was not found in the semi-savanna areas nearer the river. The soil of the savanna was pure white quartz sand and at the time the specimens cited were collected it was covered by six to eight inches of water.

37. **Macrolobium pendulum** Willd. ex Vogel, Linnaea **11**: 412. 1837. **Figure 11.**

Macrolobium racemigerum Tulasne, Arch. Mus. Par. **4**:174. 1844.
Vouapa pendula (Willd. ex Vogel) Taub. Bot. Centralbl. **47**: 394. 1891.
Vuapa pendula (Willd. ex Vogel) Kuntze, Rev. Gen. **1**: 212. 1891.
Vuapa racemigera (Tul.) Kuntze, Rev. Gen. **1**: 212. 1891.

Tree 8–20 m. tall, the branchlets very minutely puberulous or rarely glabrous. *Stipules* 5–12 mm. long, 0.5–1.5 mm. wide, persistent, linear to falcate-linear, ciliolate, acuminate. *Petioles* 4–12 mm. long, canaliculate, glabrous or very minutely puberulous on the upper surface; rachis rudiment 4.5–10.5 mm. long, persistent, acicular. *Leaflets* 5.5–11.5(–15) cm. long, 2–5(–6) cm. wide, arcuate-elliptic, the base inequilateral, acute, the apex acute with obtuse extremity, glabrous or sparingly and very minutely puberulous at the base of the upper surface, sometimes punctate beneath; costa plane above, salient beneath, the venules prominulous to prominent. *Inflorescences* 7–10.5 cm. long, glabrous, pendent, the peduncles 3–6 mm. long, the flowers distant, the buds lanceolate, acuminate; bracts 1.5–2 mm. long, 1–1.5 mm. wide, caducous, oblong, acute, glabrous except for the ciliolate margin; pedicels 7–12 mm. long; bracteoles 8.5–10.5 mm. long, 2–4.5 mm. wide, lanceolate, acuminate, glabrous or sometimes sparsely puberulous within at the base. *Hypanthium* 1–2 mm. long, sessile or on a 0.5 mm. long stipe, glabrous. *Sepals* four, 3.5–6 mm. long, 1–3.5 mm. wide, oblong, elliptic or lanceolate, the adaxial one obtuse, the others acute or acuminate, glabrous except for the tufted-ciliate apices. *Petal* blade 4.5–5 mm. long, 6.5–7.5 mm. wide, transversely oval, the claw 2.5 mm. long, auriculate basally, glabrous externally, villosulose within on the claw and into the throat of the blade. *Filaments* 11.5–21 mm. long, glabrous. *Stigma* usually simple. *Style* 14–19.5 mm. long, glabrous. *Ovary* 2–3 mm. long, 1–1.5 mm. wide, elliptic to oblong, glabrous, 2-ovulate; gynophore 3–3.5 mm. long, glabrous, inserted at the apex of the adaxial wall of the hypanthium. *Fruit* 6–8 cm. long, 4–5.5 cm. wide, oval, glabrous, the carpophores 6–7 mm. long, glabrous. *Seeds* 1–2 per fruit, about 3.5 cm. long, 3 cm. wide, oval, the testa crustose, venose.

Specimens Examined: BRAZIL: Pará: Belém, Aug. 1948, *Addison s.n.* (IAN); South Forest of I. A. N., Belém, Dec. 1942, *Archer 7956* (IAN); Rio Guamá, São Miguel, Aug. 1948, *Dardano & Black 48-3066* and *48-3085* (IAN); Arrayollos, April 1903, *Ducke 3523* (G); Rio Cumina, Nov. 1907, *Ducke 8889* (G); upper Rio Ariramba, Dec. 1910, *Ducke 11321* (G); Rio Cumina, bas Trombetas, Dec. 1910, *Ducke 11475* (G); alto Rio Ariramba, Oct. 1913, *Ducke 14959* (G); Lago Curumun, Obidos, *Ducke 15310* (BM, G); Arrayollos, regione Almeirim, April 1923, *Ducke 16934* (U); Maranhão, Assutina-Carutapera, Sept.–Dec. 1940, *Froes 11951* (NY, US); Ile Mexiana, Sept. 1901, *Guedes 2375* (G); Broganca, Dec. 1899, *Huber 1710* (US); Ilha das Onças, Belém, Sept. 1903, *Huber 3842* (G); Rio Acará, Thomé Assú, Dist. Acará, Aug. 1931, *Mexia 6050* (F, G, GH, MO, NY, U, UC, US); Pará, 1929, *Moss 38* (US); "regionis Amazonicae indigenum, juxta Egam...," *Poeppig 2889* (F, G, P) (TYPE COLLECTION of *M. racemigerum* Tul.); Cametá, Sept. 1903, *Siqueira 3795* (G); Belém, grounds of I. A. N., Jan. 1944, *Silva 42* (IAN). Amazonas: Fozdo Jutahy, Nov. 1927, *Ducke 20314* (RB); Municip. Humaytá, near Tres Casas, Sept.–Oct. 1934, *Krukoff 6162* (A, BM, F, MO, NY, U, US).

Although the type of this species has not been available for study, Vogel's description leaves no doubt of the identity of the group. Apparently he adopted an herbarium name of Willdenow's, supplied it with a description, and attributed it to the latter.

This is one of the most distinct species of this section and is not likely to be confused with any other group. The persistent stipules and rachis rudiment alone are important distinguishing characters, but the pendent racemes of widely separated flowers are also distinctive. These characters serve to differentiate it from its relatives *M. palustre* and *M. savannarum.*

38. **Macrolobium stenopetalum** Amshoff, Bull. Torrey Club 75: 389. 1948. **Figure 11.**

Shrub 1.5–3 m. tall to small tree 10 m. tall, the branchlets and leaves glabrous. *Petioles* 3–6 mm. long, canaliculate. *Leaflets* 4–10 cm. long, 1.5–2.5 cm. wide, inequilateral, strongly falcate, lanceolate, the base inequilateral, acute, the apex acute to acuminate, punctate on the lower surface; costa plane to impressed on the upper surface, salient beneath, the venules prominulous to prominent. *Inflorescences* 3–5.5 cm. long, glabrous, the peduncles 5–6.5 mm. long; bracts 1 mm. long and wide, persistent, triangular, acute, ciliolate; pedicels 5–8.5 mm. long; bracteoles 8–13.5 mm. long, 3–5 mm. wide, oblong to lanceolate, apiculate to acuminate, glabrous. *Hypanthium* 3–4 mm. long, sessile or with a stipe to 0.5 mm. long, glabrous. *Sepals* four, 6–9.5 mm. long, 1.5–4 mm. wide, oblong, oblong-lanceolate, or lanceolate, acute, glabrous except for the ciliolate apices. *Petal* 7–12.5 mm. long, 2–2.5 mm. wide near the apex, spatulate, pilosulose externally and ciliolate at the base, villose within on the lower portion, the claw not distinct. *Filaments* 18.5–22.5 mm. long, villose toward the base. *Stigma* capitellate. *Style* 15–20 mm. long, glabrous to sparsely puberulous basally. *Ovary* 3 mm. long, 1.5 mm. wide, oblong, glabrous to sparingly puberulous on the margins, the lateral surfaces glabrous, 2-ovulate; gynophore 3–5 mm. long, glabrous to sparsely and minutely puberulous, inserted at the margin of the adaxial hypanthial wall. *Fruit* 10 cm. long, 4 cm. wide, oblong, the carpophores about 13 mm. long, sparsely and minutely puberulous basally. *Seed* 2 cm. in diameter, suborbicular, flat, the membranous testa sparsely venulose.

Type Collection: *B. Maguire 24792*, "Savanna No. IV, Tafelberg," Surinam, Sept. 1944 (HOLOTYPE NY, isotypes F, U, US).

Additional Specimens: Savanna No. II, Tafelberg, Surinam, Aug. 1944, *Maguire 24232* (F, MO, NY, U, US); Savanna No. IV, Surinam, Aug. 1944, *Maguire 24375* (F, NY, U, US).

This species exhibits, perhaps, the greatest affinity with *M. pendulum* but even this relationship is rather remote. It differs from the latter in the shape of its leaflets, its caducous stipules, its very different petal form, and the length of its hypanthium, which may be as much as twice as long. The lack of a well-delimited claw to the petal blade is particularly striking and especially interesting because its form approaches that of sect. *Stenosolen.*

39. **Macrolobium stenosiphon** Harms, Repert. Nov. Sp. 3: 51. 1906. **Figure 12.**

Pseudovouapa stenosiphon (Harms) Britton & Killip, Ann. N. Y. Acad. 35: 166. 1936.

Tree 10–15 m. tall, 6 dm. in diameter, the branchlets glabrous. *Stipules* 17–25 mm. long, 3–9 mm. wide, foliaceous, persistent through one season, falcate-elliptic, acuminate, minutely ciliolate, otherwise glabrous. *Leaves* oblong, 20–30-jugate, the pairs (4–)5–9(–12) mm. apart. *Petioles* (7–)10(–15) mm. long, canaliculate, uncinate-puberulous in the canal; rachis (11–)18(–24.5) cm. long, uncinate-puberulous or puberulous on the upper surface, glabrous beneath. *Leaflets* 20–30 mm. long, 3–10 mm. wide, lanceolate, each leaflet somewhat arcuate toward the leaf apex, acuminate or infrequently acute, mucronate, the base inequilateral, the upper side rounded and obtuse to subcordate, the lower side acute; margin densely appressed-sericeous in a narrow band on the upper surface; costa plane to salient, the venules closely parallel, prominulous. *Inflorescences* 5–8 cm. long, ramiflorous, glabrous, sessile; pedicels 4–7 mm. long, glabrous; bracteoles 15.5–20 mm. long, 6–7.5 mm. wide, elliptic, acute to acuminate, glabrous on the outer surface, more or less puberulous within. *Hypanthium* 18–24 mm. long, on a stipe 1.5–2.5 mm. long, glabrous, gibbous at the base on the abaxial side, widening toward the apex. *Sepals* 18–22 mm. long, 3–6.5 mm. wide, oblong, obtuse, glabrous or sparsely ciliolate. *Petal* blade 30–40 mm. long, 14–18 mm. wide, oblanceolate, pilosulose within on the costa in the basal portion, the claw 3–4 mm. long, puberulous toward the base externally, pilosulose within; 1–3 petalodia sometimes present, linear, acute. *Filaments* 30–35 mm. long, villosulose basally, the anthers 5.5–6 mm. long, 2–2.5 mm. wide. *Stigma* capitellate to capitate. *Style* 32–34 mm. long, glabrous. *Ovary* 5–7.5 mm. long, 1.5–2 mm. wide, oblong, glabrous, (4–)6–8-ovulate, the free portion of the gynophore 4.5–6.5 mm. long, glabrous. *Fruit* (immature) 11 cm. long, 2.5 cm. wide, oblong narrowly, glabrous, the carpophores 33 mm. long, glabrous.

LECTOTYPE: *F.C. Lehmann 8987*, "häufig an den Ufern der Flusse Timbiqui und Micay, 0–400 m.," Colombia, 1899 (deposited NY, fragmentary isolectotype F). The holotype was on deposit at the Berlin Herbarium but it is assumed that it was destroyed in the disastrous fires which occurred there during the last war. The director of that institution has informed us that there is no material of this genus in their herbarium. The New York sheet bears only two flowers but abundant vegetative material. A note on this sheet in Britton's hand states that the specimen in the Kew Herbarium is undetermined, indicating that Harms did not annotate that sheet nor is the New York sheet annotated by him.

Additional Specimens: COLOMBIA: Dept. del Valle: Río Yurumanguí entre Isla de Golondro y la Amargura, Feb. 1944, *Cuatrecasas 16041* (US); Río Cajambre, Ouebrada de Ordonez, May 1944, *Cuatrecasas 17267* (US); Río Colima, Quebrada de la Brea, May 1946, *Cuatrecasas 21298* (F). Dept. del Choco: La Concepción, 15 km. east of Quibdo, May 1931, *Archer 1954* (NY, US); headwaters Río Tutunendo, east of Quibdó, May 1931, *Archer 2196* (NY, US); south of Río Condoto, between Quebrada Guarapo and Mandinga, April 1939, *Killip 35431* (US); Novitá, *Triana 4418* (NY, US).

ECUADOR: Prov. Esmeraldos: Selva Alegre up Río Santiago to Playa de Oro, *Little 6393* (NY).

Vernacular Names: "chiparo dormilon," "dormilon."

Of the specimens cited, only *Killip 35431*, a sterile collection, is in need of further comment. It may represent a new species closely related to *M. stenosiphon* or it may be a distinct subspecific taxon within the latter. The following characters are discordant with the rest of the material: (1) branchlets pilosulose; (2) stipules linear, 8.5 mm. long, 1 mm. wide; (3) 35–43 pairs of leaflets on a rachis 14–15 cm. long; and (4) leaflets 12–22 mm. long, 2–5 mm. wide. It is cited here in spite of these differences, but its characters are not included in the description of the species.

This species with *M. trinitense* and *M. colombianum* forms a distinct line of relationship. The latter two are obviously related but *M. stenosiphon* is so utterly different from either that it must stand alone, with no known close relatives. It is readily separable from the other two species by its larger number of leaflet pairs, the shape of its leaflets and by the marginal sericeous band on the upper surfaces of the latter. It also has a much longer hypanthium, calyx, and petal than the other two species.

40. **Macrolobium colombianum** (Britton & Killip) Killip, Caldasia 4: 213. 1946. **Figure 12.**

Shrub or tree to 15 m. tall, the branchlets glabrous, pilose, pilosulose, or pilosulose and puberulous. *Stipules* 5–25 mm. long, 1.5–8 mm. wide, persistent for at least one season, foliaceous or not, subulate-lanceolate or narrowly to broadly elliptic, acute, acuminate, or caudate-acuminate, falcate or straight, glabrous or more or less pilosulose or puberulous externally, the inner surface glabrous or pilosulose toward the base. *Leaves* 5–13-jugate, the pairs 6–22 mm. apart. *Petioles* 2–15 mm. long, subalate-canaliculate, pilose, pilosulose, puberulous, or pilosulose and puberulous; rachis 4–14 cm. long, puberulous on the upper surface, most of the hairs uncinate, the wings glabrous beneath, the axis glabrous, pilose, or pilosulose beneath. *Leaflets* 9–72 mm. long, 4–20 mm. wide, oblong to elliptic or lanceolate-oblong, the base inequilateral, the lower side obtuse, the upper acute to obtuse, the apex obtuse, emarginate, often apiculate; upper surface puberulous on the costa, beneath glabrous to pilosulose on the costa and often on the basal part of the blade; costa plane to impressed on the upper surface, salient beneath, the venules obscure to prominulous. *Inflorescences* 2.5–9 cm. long, the axis minutely puberulous or glabrous, the peduncles 0–6 mm. long; bracts 2 mm. long, 1 mm. wide, lanceolate, glabrous within, puberulous at the base externally; pedicels 2.5–6.5 mm. long, glabrous or puberulous; bracteoles 5–9 mm. long, 2.5–4 mm. wide, oblanceolate or obovate, glabrous or more or less puberulous externally, glabrous or sparsely appressed-puberulous within. *Hypanthium* 5–8 mm. long, glabrous to sparingly puberulous, on a stipe 0.5–2.5 mm. long. *Sepals* 6–11 mm. long, 2–6 mm. wide, oblong to elliptic or obovate, glabrous or ciliolate. *Petal* sessile or subsessile, 15–25 mm. long, 7–13 mm. wide, elliptic, glabrous or basally villose on the outer surface, villose within on the costa in a broad band. *Filaments* 12–35 mm. long, villose in the basal part, the anthers 2.5–3 mm. long, 1.5–2 mm. wide. *Stigma* capitellate, or capitate. *Style* 15–27.5 mm. long, pilose or pilosulose basally. *Ovary* 2.5–3 mm. long, 1.5 mm. wide, oblong, oblong-elliptic or oblong-oblanceolate, 3–5-ovulate, the margins pilosulose or pilose, the lateral surfaces glabrous, pilosulose, or puberulous; free portion of the gynophore 2.5–4 mm. long, pilose or pilosulose. *Fruit* 10.5–11.5 cm. long, 3.5–4 cm. wide, oblong, the margins pilosulose and the lateral surfaces glabrous, or puberulous on all surfaces, the carpophores 4–12 mm. long, pilosulose. *Seeds* 2–2.5 cm. long, 2 cm. wide, obovate to suborbicular.

Key to the Varieties of *Macrolobium colombianum*

1. Ovary and fruit pubescent only on margins. .... 4.
1. Ovary and fruit pubescent on all surfaces. .... 2.
2. Leaflets lanceolate-oblong, 12–13 pairs, 12–26 mm. long, 7–10 mm. wide; carpophores 4–5 mm. long. Northeastern Venezuela. .... 40a. var. *monagasense.*
2. Leaflets oblong, fewer, usually larger; carpophores 9–12 mm. long. Northern Venezuela and Colombian Andes. .... 3.
3. Leaves 7–10-jugate; stipules 15–25 mm. long. Eastern foothills of Colombian Andes. .. .. 40b. var. *metaense.*
3. Leaves 5–8-jugate; stipules 8.5–15 mm. long. Northern coastal range of Venezuela. ... . 40c. var. *ocumarense.*
4. Stipules 25 mm. long, 5 mm. wide, foliaceous, falcate-fusiform; leaves 6–13-jugate, petioles 2–6 mm. long; inflorescence 3.5–5 cm. long, axis puberulous, pedicels 3–3.5 mm. long, puberulous. .... 40d. var. *bicuspidum.*
4. Stipules 5 mm. long, 1.5 mm. wide, nonfoliaceous, subulate-lanceolate; leaves 5–6-jugate, petioles 10–15 mm. long; inflorescence 7–9 cm. long, axis glabrous, pedicels 5–6.5 mm. long, glabrous. .... 40e. var. *colombianum.*

40a. Macrolobium colombianum var. **monagasense** Cowan, var. nov. **Figure 12.**

Arbor, ramulis pilosulis. Folia oblonga, 12–13-jugata, paribus 6–8 mm. separatis. Petiolus 5–8 mm. longus, puberulus, sulcatus; rachis 5.5–7 cm. longa, supra uncinato-puberula, infra pilosula. Foliola 12–26 mm. longa, 7–10 mm. lata, lanceolato-oblonga, pari inferiore ovali, in costa supra puberula, infra basim versus pilosula. Flores non vidi. Fructus oblongus, ubique puberulus, carpophoro 4–5 mm. longo, pilosulo et puberulo, semina circa 2 cm. diametro, suborbicularia.

Type Collection: *J. Steyermark 61841*, "forested southwest-facing slopes of Cerro Negro, above La Sabana de las Piedras, northwest of Caripe, alt. 1500 meters," State of Monagas, Venezuela, April 1945 (HOLOTYPE F, isotype VEN). Known only by the type collection.

40b. Macrolobium colombianum var. metaense Cowan, var. nov. **Figure 12.**

Arbuscula ad 2.5 m. alta vel arbor 5–6 m. alta, ramulis pilosis. Stipulae 15–25 mm. longae, 4–8 mm. latae, foliaceae, falcatae, ellipticae, acuminatae. Folia obovata vel oblanceolata, 7–10-jugata, paribus 6–15 mm. separatis. Petioli 3–7 mm. longi, pilosi; rachis 7–12 cm. longa, supra uncinato-puberula, infra alis glabris, axe piloso. Foliola (13–)20–55 mm. longa, (4–)8–20 mm. lata, oblonga, costa puberula supra, infra plus minusve pilosula. Inflorescentiae 2.5–5.5 cm. longae, terminales, sessiles; bracteis 2 mm. longis, 1 mm. latis, intus glabris, extus ad basim puberulis; pedicelli 2.5–5 mm. longi, puberuli; bracteolae 6–9 mm. longae, 3–4 mm. latae, ovales ad obovatae, extus plus minusve puberulae, intus glabrae. Hypanthium 5–8 mm. longum, stipite ca. 1 mm. longo, puberulum. Sepala (6–)8–12 mm. longa, (2–)4–6 mm. lata, ad apicem sparse ciliolata, oblonga ad elliptica vel obovata. Petalus 20–25 mm. longus, 8.5–13 mm. latus, sessilis vel unguicilo 2–2.5 mm. longo. Filamenta 30–35 mm. longa, basim versus villosula, antherae 2.5–3 mm. longae, 1.5–2 mm. latae. Stigma capitellatum. Stylus 20–27.5 mm. longus, basim versus pilosulus. Ovarium 3 mm. longum, 1–1.5 mm. latum, oblongum, lateraliter puberulum vel pilosulum, gynophoro 4 mm. longo, pilosulo. Fructus elongato-oblongus, marginibus puberulis, carpophoro 10 mm. longo, pilosulo.

Type Collection: *R. Jaramillo, D. Mesa, et al. 412*, "Acacías, Intendencia del Meta," Colombia, Aug. 1946 (HOLOTYPE US).

Additional Specimens: COLOMBIA: Meta: Los Llanos, Villavicencio toward El Parrao, Nov. 1938, *Cuatrecasas 4607* (US); Quebrada Negra, near Villavicencio, Jan. 1939, *Haught 2555* (F, NY, US); Acacías, Aug. 1946, *Uribe 1359* (US).

40c. Macrolobium colombianum var. ocumarense Cowan, var. nov. **Figure 12.**

Arbor 4–5 m. alta, ramulis pilosulis. Stipulae 8.5–15 mm. longae, 3.5–6.5 mm. latae, foliaceae, falcatae, ellipticae, acutae. Folia plus minusve obovata, 5–8-jugata, paribus 7–22 mm. separatis. Petioli 4–15 mm. longi; rachis 4–14 mm. longa, petiolis et rachibus uncinato-puberulis supra, infra glabris vel plus minusve pilosulis. Foliola 9–52 mm. longa, 5–24 mm. lata, oblonga vel elliptico-oblonga, costa supra dense puberula, lamina glabra vel ad basim puberula, in costa infra basim versus pilosula; costa plana vel sparse impressa supra. Flores non vidi. Fructus 11.5–12 cm. longus, 4 cm. latus, oblongus, apicem versus latior, puberulus, carpophoro 9–12 mm. longo, semina 2.5 cm. longa, 2 cm. lata, obovata.

Type Collection: *H. Pittier 12164*, "En las selvas pluviales inferiores de los valles de Ocumare, Aragua, 500–800 m.," Venezuela, April 1926 (HOLOTYPE VEN, isotype US).

Additional Specimens: VENEZUELA: Carabobo, upper Guaremales, road from Puerto Cabello to San Felipe, July 1920, *Pittier 8971* (US, VEN); Perico, road from Caracas to La Guajra, *Pittier 8971a* (VEN).

Vernacular Names: "grifo negro," "roso picure."

The last collection cited above bears the number 8971 but since this number was also assigned to another collection it is here referred to as 8971a to distinguish the two collections.

40d. Macrolobium colombianum var. bicuspidum (Pittier) Cowan, comb. nov. **Figure 12.**

Macrolobium bicuspidum Pittier, Bol. Soc. Venez. Ci. Nat. 7: 140. 1941.

Tree 12–15 m. tall, the branchlets pilosulose and puberulous, the hairs often uncinate. *Stipules* 25 mm. long, 5 mm. wide, foliaceous, falcate-fusiform, acuminate, ciliolate, pilosulose on the costa. *Leaves* oblong-oblanceolate or obovate, 6–13-jugate, the pairs 8–12 mm. apart. *Petioles* 2–6 mm. long, pilose, sometimes also puberulous; rachis 6–13.5 cm. long, uncinate puberulous on the upper sur-

face, the wings glabrous beneath, the axis more or less pilose. *Leaflets* 13-44 mm. long, 8-15 mm. wide, the basal pair oval, the others oblong; puberulous on the costa above, puberulous on the costa and sometimes also on the basal portion of the blade beneath. *Inflorescences* 3.5-5 cm. long, axillary or terminal, the peduncle 1-2 mm. long; pedicels 3-3.5 mm. long, puberulous; bracteoles 5-5.5 mm. long, 2.5 mm. wide, oblanceolate, externally puberulous basally and on the costa, glabrous within. *Hypanthium* 5 mm. long on a 1 mm. stipe, sparingly puberulous. *Sepals* 6-7 mm. long, 2-3 mm. wide, oblong, glabrous. *Filaments* about 12 mm. long, basally pilose. *Ovary* oblong-elliptic, pilose marginally, the lateral surfaces glabrous, 4-ovulate; free portion of the gynophore 2.5 mm. long, pilose. *Fruit* (immature) oblong, wider toward the apex, the margins sparsely pilosulose, the carpophores about 10 mm. long; seeds 4.

Type Collection: *E. Delgado 299*, "Camino antiquo de Caracas a La Guaira, D. F.," Venezuela, July-Nov. 1939-40 (HOLOTYPE VEN, isotypes F, US).

Additional Specimens: COLOMBIA: Cordillera Oriental, Dept. Norte de Santander, Sarare region, confluence of Ríos Cubugon & Cobaria, Nov. 1941, *Cuatrecasas 13204* (COL, US).

40e. Macrolobium colombianum var. colombianum. Figure 12.

Outea "(?)" colombiana Britton & Killip, Ann. N. Y. Acad. 35: 166. 1936.

Branchlets glabrous or the very young ones sparsely pilosulose. *Stipules* 5 mm. long, 1.5 mm. wide, subulate-lanceolate, acuminate, persistent, sparsely puberulous on the outer surface. *Leaves* 5-6-jugate, the pairs 12-20 mm. apart. *Petioles* 10-15 mm. long, subalate-canaliculate; rachis 6.5-9 cm. long, the rachis and petioles puberulous on the upper surface, glabrous beneath. *Leaflets* 33-72 mm. long, 12-18 mm. wide, elliptic or oblong-elliptic, densely puberulous above on the costa, glabrous beneath, the venules prominulous. *Inflorescences* 7-9 cm. long, the axis glabrous, the peduncles 2-6 mm. long, sparsely and minutely puberulous; pedicels 5-6.5 mm. long, glabrous; bracteoles 8 mm. long, 4 mm. wide, oblanceolate, glabrous externally, sparsely appressed-puberulous within. *Hypanthium* 4.5-5 mm. long, on a stipe 2.5 mm. long, glabrous. *Sepals* 7 mm. long, 2.5-3 mm. wide, oblong, rotund-obtuse, glabrous. *Corolla* and *androecium* unknown. *Stigma* capitellate. *Style* about 15 mm. long, pilosulose basally. *Ovary* 2.5 mm. long, 1.5 mm. wide, oblong-oblanceolate, the margins densely pilosulose, the lateral surfaces glabrous, 3-4-ovulate; free portion of the gynophore 3 mm. long, pilosulose. *Fruit* unknown.

Type Collection: *J. Triana 4419*, "Istmo de S^{n}. Pablo, Nouvelle-Grenade.- Prov. de Choco, hauteur 70 metr.," March 1853 (HOLOTYPE NY, isotypes BM, COL, US). Known only by the type collection.

The only near relative of this rather complex species is certainly *M. trinitense*, although there is a very remote connection with *M. stenosiphon*. *M. colombianum* is set off from its nearest relative by its leaves having a greater number of pairs of differently shaped leaflets, by its more or less pubescent ovary, and by the geographic distribution.

The varieties composing this species are based primarily on the distribution of the ovary pubescence, number of pairs of leaflets per leaf, shape of the leaflets, size and shape of the stipules, and the geographic distribution. Var. *monagasense*, with its numerous pairs of lanceolate-oblong leaflets and pubescent ovary, is not particularly closely related to either var. *metaense* or var. *ocumatense*, its nearest relatives. These latter varieties also have pubescent ovaries and/or fruit and differ from one another in the number of leaflet pairs, size of the stipules, and geographic distribution.

The glabrous ovary of the typical variety and var. *bicuspidum* serve to differentiate them from the other taxa of the same rank. Quite a number of characters separate them from each other. The more important of these are the size and nature of the stipules, number of leaflet pairs, petiole length and presence or absence of pubescence on the inflorescence.

41. Macrolobium trinitense Urban, Symb. Ant. 1: 314. 1899.

Tree to 25 m. tall, 4 dm. in diameter, the branchlets very minutely puberulous but glabrescent. *Leaves* 2-4-jugate, the petioles 5-18 mm. long, canaliculate, the rachis (1.5-)3-8 cm. long, the petiole and rachis uncinate-puberulous on the upper surface, glabrous beneath. *Leaflets* 43-85 mm. long, 15-45 mm. wide, elliptic, the base inequilateral, the upper side subcordate, the lower acute, the apex subacuminate to acuminate, the extremity truncate, entire or slightly retuse; costa plane to subsalient on the upper surface, salient beneath, the venules prominulous. *Inflorescences* 4-11 cm. long, cauliflorous, fasciculate, the axis glabrous, the peduncle 5-12 mm. long; pedicels 6-15 mm. long, filiform, glabrous; bracteoles 8-9 mm. long, 3.5 mm. wide, oblong-oblanceolate, glabrous. *Hypanthium* 5.5-6 mm. long, on a stipe about 1.5 mm. long, glabrous. *Sepals* 5-7.5 mm. long, 2.5-3.5 mm. wide, oblong, elliptic, or obovate, obtuse. *Petal* subsessile, the blade 10-15 mm. long, 7.5-9.5 mm. wide, oval to ovate, the claw 0.5-1.5 mm. long, glabrous on the outer surface, villosulose within on the lower portion of the costa. *Filaments* 12.5-18 mm. long, villosulose in the lower portion, the anthers 3 mm. long, 1.5-2 mm. wide. *Stigma* capitellate. *Style* about 10 mm. long, glabrous. *Ovary* 2.5 mm. long, 1.5 mm. wide, oblong, glabrous, 3-4-ovulate, the free portion of the gynophore 1-3 mm. long, glabrous. *Fruit* unknown.

Type Collection: *W. E. Broadway (Trinidad Bot. Gard. Herb. No.) 5216*, Tucuche, Trinidad, Jan. 1893 (HOLOTYPE presumably at Trinidad Herbarium, isotype NY).

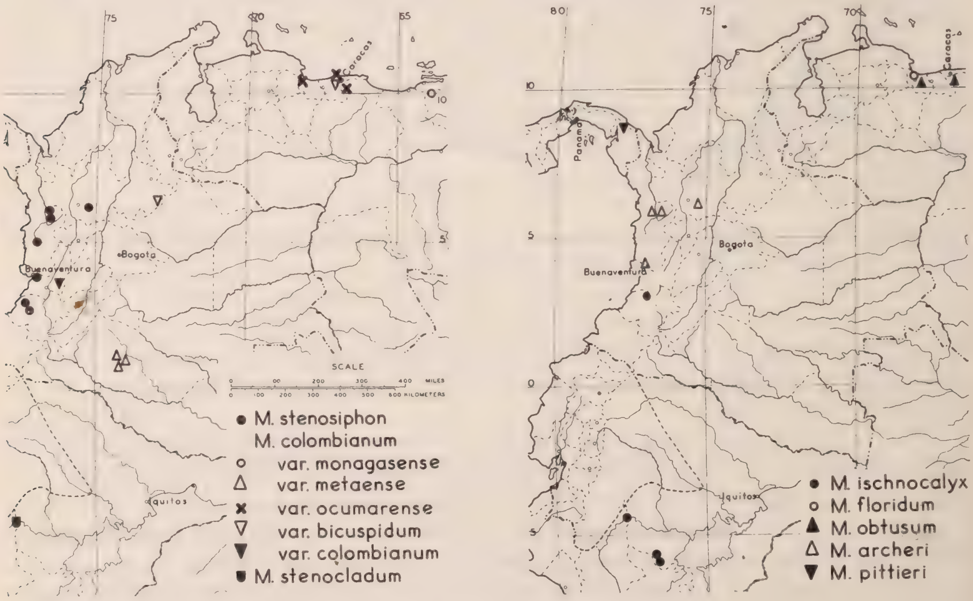
75
70
65
10
5
Bogota
Buenaventura
Iquitos
Caracas
SCALE
0 100 200 300 400 MILES
0 100 200 300 400 500 600 KILOMETERS
● M. stenosiphon
M. colombianum
○ var. monagasense
△ var. metaense
✖ var. ocumarense
▽ var. bicuspidum
▼ var. colombianum
■ M. stenocladum
80
75
70
10
5
0
Panama
Bogota
Buenaventura
Iquitos
Caracas
● M. ischnocalyx
○ M. floridum
▲ M. obtusum
△ M. archeri
▼ M. pittieri

FIG. 12. Geographic distribution of most of the species of section *Stenosolen*.

Additional Specimens: El Tucuche, Trinidad, Oct. 1943, *Beard 149* (A, U).

This species is closely allied to *M. colombianum* and especially to the typical variety of that species. It is amply distinct from *M. colombianum* by its long filiform and glabrous pedicels, its cauliflorous inflorescences, by its elliptic leaflets being in only two to four pairs, and by the geographic distribution.

42. **Macrolobium stenocladum** Harms, Notizbl. 9: 969. 1926. **Figure 12.**

Tree 8–10 m. tall, 15 cm. diameter, the branchlets minutely puberulous. *Stipules* 3 mm. long, 0.5 mm. wide, persistent, subulate, acuminate, weakly ciliolate. *Leaves* glabrous except for the petioles, the latter 2.5–5 mm. long, broadly canaliculate, minutely puberulous, the rachis vestige to 2 mm. long, linear. *Leaflets* 6.5–10 cm. long, 2.5–5 cm. wide, sessile, elliptic, the base inequilateral, acute, the apex obtusely acute, the costa impressed on the upper surface, salient beneath. *Inflorescence* to 3 cm. long, the axis minutely puberulous; pedicels 2–6 mm. long, minutely puberulous; bracteoles 8–8.5 mm. long, about 3.5 mm. wide, oblanceolate, the apex rounded and slightly apiculate, glabrous except for minute hairs at the apex. *Hypanthium* 6.5 mm. long, on a stipe 2 mm. long, sparsely and minutely puberulous. *Sepals* 11–12.5 mm. long, 3–4.5 mm. wide, oblanceolate, acute, the abaxial one strongly cancave, glabrous except for the ciliolate margins. *Petal* blade about 20 mm. long, 10 mm. wide, more or less ovate, the claw 3 mm. long, poorly delimited, glabrous externally, the claw ciliolate sparsely, villose within on the costa and over the center of the blade. *Filaments* glabrous, the anthers (in bud) 3 mm. long, 1 mm. wide. *Style* puberulous basally. *Ovary* 3 mm. long, 1 mm. wide, more or less fusiform, densely and minutely puberulous on all surfaces, 4-ovulate; free portion of the gynophore about 1.5 mm. long, densely and minutely puberulous. *Fruit* unknown.

LECTOTYPE: *G. Tessmann 4091*, mouth of Río Santiago, upper Rio Marañón, 160 m., East Peru, Sept. 1924 (deposited G, isolectotypes F-frag., NY, US). Known only by the type collection.

As with *M. stenosiphon*, the selection of a lectotype is necessitated by the destruction of the holotype at the Berlin Herbarium in fires during the last war.

Macrolobium stenocladum is perhaps most closely related to *M. ischnocalyx* but the connection is rather tenuous. It differs from the latter by having much smaller, sessile leaflets, sepals of different form, and the lateral surfaces of the ovary puberulous rather than granular-puberulous as in *M. ischnocalyx.*

43. **Macrolobium ischnocalyx** Harms, Notizbl. 9: 968. 1926. **Figure 12.**

Low tree 3–5 m. tall, about 15 cm. diameter, the branchlets very minutely puberulous. *Leaves* with petioles 2–5 mm. long, sulcate to canaliculate, very minutely puberulous; petiolules 2–4 mm. long, canaliculate-alate, very minutely puberulous. *Leaflets* 13.5–33 cm. long, 3.5–12 cm. wide, equilateral, elliptic, the base equilateral, acute, decurrent, the apex acuminate with the extremity blunt or acute; upper surface glabrous, very minutely and sparsely puberulous on the costa beneath; costa salient on both surfaces but more strongly so beneath, the venules obscure to prominent on the upper surface, prominulous to prominent beneath. *Inflorescences* 3.5–9.5 cm. long, cauliflorous, the axis very minutely puberulous, the peduncles 3–5 mm. long; bracts 1.5 mm. long, 1 mm. wide, caducous, triangular, acuminate, ciliolate, glabrous within, very minutely puberulous externally; pedicels 2.5–5 mm. long; bracteoles 9–13 mm. long, 4–6 mm. wide, oblong-oblanceolate, the apex rounded and slightly apiculate, glabrous within, minutely puberulous externally. *Hypanthium* 6–11 mm. long, on a stipe 2.5–5.5 mm. long, both minutely puberulous. *Sepals* 10.5–15 mm. long, 3–5.5 mm. wide, oblong, obtuse, glabrous within, very minutely puberulous outside, ciliolate. *Petal* blade 20–28 mm. long, 8–13 mm. wide, lanceolate, the claw 4–6 mm. long, glabrous or sparingly villosulose within on the lower part of the costa; one petalodium sometimes developed, 15.5–17.5 mm. long, 2–5 mm. wide, linear or oblanceolate-spatulate, acute or obtuse. *Filaments* 32–38 mm. long, glabrous, the anthers 4–4.5 mm. long, 2 mm. wide. *Stigma* capitate. *Style* about 20 mm. long, minutely puberulous at the base. *Ovary* 2–4.5 mm. long, 1–2 mm. wide, oblong, densely puberulous on the margins but only sparingly and minutely granular-puberulous on the lateral surfaces, 4–5-ovulate; free portion of the gynophore 1.5–3.5 mm. long, minutely puberulous. *Fruit* unknown.

Type Collection: *G. Tessmann 4265*, upper Marañón, mouth of the Río Santiago, 160 m., Peru, Oct. 1924 (fragment of HOLOTYPE F; a Tessmann collection without collection number or data is deposited at NY and may be an isotype).

Additional Specimens: Balsapuerto, Dept. Loreto, Peru, Jan. and May 1933, *Klug 2863, 3046* (A, F, G, GH, MO, NY, US); Veneral, Rio Yurumanguí, Dept. del Valle, Colombia, Jan.–Feb., *Cuatrecasas 15752* (F).

This species, while exhibiting some relationship to *M. stenocladum*, is probably much more nearly allied to *M. modicopetalum*. From the latter *M. ischnocalyx* may be separated by its longer pedicels, bracteoles, hypanthium, sepals and petal. Also, the sepals of this species are puberulous on the outer surface and its ovary is minutely granular-puberulous laterally.

The collection from Colombia is referred here with some reservation, for it exhibits certain characteristics which do not conform with the bulk of the material of this species. It appears to be a glabrous form, as the characteristic puberulence of the hypanthium, sepals, and leaflet costa is lacking or nearly lacking.

44. **Macrolobium modicopetalum** Schery, Ann. Mo. Bot. Gard. 30: 88. 1943.

Tree 3–10 m. tall, the branchlets very minutely puberulous. *Petioles* 5–12 mm. long, canaliculate, very minutely puberulous; petiolules usually present, to 4 mm. long, minutely puberulous. *Leaflets* 14.5–26 cm. long, 5–9 cm. wide, equilateral, elliptic, the base equilateral to inequilateral, acute, decurrent, the apex acuminate to long-acuminate, the margin sometimes irregularly undulate; glabrous except on the costa base on one or both surfaces, minutely punctate; costa salient on both surfaces, the venules obscure to prominulous above, prominulous to prominent beneath. *Inflorescence* 7–9 cm. long, cauliflorous, the axis very minutely puberulous, the peduncle 3–4 mm. long; pedicels 0.5–1 mm. long; bracteoles 5.5–7.5 mm. long, 2.5–3.5 mm. wide, obovate, the apex rotund, sometimes slightly apiculate, glabrous within, very minutely puberulous externally. *Hypanthium* 3–4 mm. long, on a stipe 0.5–1 mm. long, glabrous. *Sepals* 5–8.5 mm. long, 1–3.5 mm. wide, oblong, obtuse, somewhat concave, glabrous or minutely ciliolate apically. *Petal* 11.5–13.5 mm. long, 5–7.5 mm. wide, lanceolate, sessile, basally pilosulose externally, villose within in a broad band on the basal two-thirds of the costa. *Filaments* 13.5–14.5 mm. long, sparsely pilosulose basally, the anthers 2.5 mm. long, 2 mm. wide. *Stigma* simple or slightly swollen. *Style* ca. 15 mm. long, puberulous basally. *Ovary* 2.5 mm. long, 1 mm. wide, oblong to oblanceolate, appressed-puberulous on the margins, glabrous laterally or very rarely totally glabrous, 3-ovulate; free portion of the gynophore 1–2 mm. long, minutely puberulous or rarely glabrous. *Fruit* unknown.

Type Collection: *H. von Wedel 2226*, "Fish Creek, vicinity Chiriquí Lagoon, Provincia de Bocas del Toro," Panama, April 1941 (HOLOTYPE MO, isotypes GH, US).

Additional Specimens: Rio Dagua, Colombia, *Lehmann 1129* (K); same locality as the type, April and May 1941, *von Wedel 2209* (GH, MO, US), *2291* (GH, MO), and *2399* (MO, US).

The collection from Colombia, *Lehmann 1129*, must certainly be assigned here but it exhibits sufficient differences that it may well represent a new subspecific taxon within this species. Unfortunately, it is only in bud and is not adequate for critical study. It differs from the rest of the material cited in having a glabrous ovary and the sepals are sparsely puberulous on the inner surfaces.

This northernmost representative of the genus finds its nearest relative in western Peru in *M. ischnocalyx*, from which it differs in a number of respects: (1) it has shorter pedicels, bracteoles, and hypanthium; (2) its sepals are smaller and are glabrous or at most ciliolate minutely at the apex; (3) the ovary is glabrous on the lateral surfaces and the petal is sessile and smaller.

45. **Macrolobium floridum** Karsten, Fl. Columb. **1**: 151. 1861. **Figure 12.**

Large tree with glabrous branchlets and leaves, the petioles 4–6 mm. long. *Leaflets* 25–30 cm. long, 8–11 cm. wide, sessile, oblanceolate-elliptic, the base inequilateral, the lower side rotund-subcordate, the upper acute, the apex bluntly acute; costa salient, the primary veins prominulous above, prominently salient beneath, the venules prominulous. *Inflorescence* about 5–15 cm. long, peduncle 3.5 mm. long, the axis minutely puberulous; bracts 2–3 mm. long and wide, oval, acute, glabrous within, puberulous externally. *Hypanthium* 9–12 mm. long, on a stipe 2 mm. long. *Sepals* 10–13 mm. long, 3–7 mm. wide, elliptic-oblong, obtuse apically, glabrous within, puberulous externally. *Petal* blade 27–35 mm. long, 15–18 mm. wide, elliptic-oblong, the claw about 3 mm. long, pilosulose basally on the costa. *Filaments* 40–45 mm. long, glabrous, the anthers 5 mm. long, 2 mm. wide. *Stigma* subcapitate. *Style* about 35 mm. long, short-pilosulose. *Ovary* about 3 mm. long, 1 mm. wide, oblong, short-pilosulose marginally, laterally puberulous, 5-ovulate; free portion of the gynophore about 2 mm. long, pilosulose. *Fruit* unknown.

Type Collection: *Karsten s.n.*, "Cordillera littorali Venezuelae prope Puerto Cabello in silva humida, umbrosa montis, 'Cumbre chiquita' appelati, altitudine 200 metr.," Aragua, Venezuela (HOLOTYPE presumably at Leningrad, isotype W).

As far as may be judged, this species is most closely related to *M. archeri* of western Colombia. *M. floridum* is set apart from its nearest relative by its acute leaflets, longer inflorescences, shorter sepals, and pubescent hypanthium.

46. **Macrolobium obtusum** Pittier, Bol. Soc. Venez. Ci. Nat. 7: 142. 1941. **Figure 12.**

Tree to 12 m. tall, the branchlets and leaves glabrous. *Petioles* 3–5 mm. long. *Leaflets* 17–30 cm. long, 7–16 cm. wide, sessile, equilateral, broadly elliptic-oval or oblanceolate, the base inequilateral, acute on the upper side, broadly rounded-obtuse on the lower side, the apex broadly rounded-obtuse; costa plane to subsalient on the upper surface, salient beneath, the venules prominulous to obscure above, prominulous to prominent beneath. *Inflorescences* 3.5–9.5 cm. long, terminal on the old branchlets or lateral on old wood, the axis very minutely puberulous; bracts 1–1.5 mm. long and wide, triangular, caducous, or persistent, glabrous within, sparsely and minutely puberulous externally, sometimes minutely ciliolate; pedicels 1.5–4 mm. long, very minutely puberulous; bracteoles 8–11 mm. long, 4–6 mm. wide, oval or elliptic-obovate, the apex rotund, glabrous within, sparsely and very minutely puberulous externally. *Hypanthium* 6.5–9.5 mm. long, on a stipe 1–1.5 mm. long, both minutely puberulous. *Sepals* 10–13 mm. long, 2.5–7 mm. wide, oblong or oblong-oval, obtuse, sometimes apiculate, carnose-coriaceous, ciliolate, glabrous within, very minutely puberulous outside. *Petal* blade 20 mm. long, 6 mm. wide, narrowly elliptic, the claw 3 mm. long, glabrous externally, villose within on the costa. *Filaments* 35 mm. long, sparsely villosulose toward the base, the anthers 6.5 mm. long, 3.5 mm. wide. *Stigma* slightly swollen. *Style* 22.5–23 mm. long, puberulous basally. *Ovary* 2–3 mm. long, 1.5 mm. wide, oblong, puberulous on the margins, laterally glabrous, 4-ovulate; free portion of the gynophore 2 mm. long, minutely puberulous. *Fruit* unknown.

Type Collection: *H. Pittier 13975*, "Selvas inferiores del valle de Ocumare (Parque nacional) 600 m.," Aragua, Venezuela, April 1937 (HOLOTYPE VEN, isotype US).

Additional Specimens: VENEZUELA: Prope coloniam Tovar, between Valencia and Campanero, July or March 1857, *Fendler 2474* (GH); Parque Nacional, between Rancho Grande and Maracay, Aragua, Dec. 1943, *Steyermark 54963* (F, MO, VEN).

Macrolobium obtusum is perhaps most closely allied to *M. floridum* which was described from this same general area of Venezuela. However, *M. obtusum* may be distinguished by the broadly rounded leaflet apices, by its smaller bracts and petal and by its generally shorter hypanthium.

47. Macrolobium archeri Cowan, sp. nov. **Figure 12.**

Alta arbor vel gracile arbustum 5 m. altum, ramulis glabris vel microscopico-puberulis. Folia glabra; petiolus 2–6 mm. longus, subsulcatus ad canaliculatus, glaber vel minute puberulus. Foliola 21.5–50 cm. longa, 6–11 cm. lata, subaequilateralia, elliptica, ad basim inaequilateralia, latere superiore acuto et inferiore rotundato-obtuso, ad apicem acuminata et extremitate obtusa vel acuta, infra punctata; costa salienti sed infra validiore, venulis obscuris ad prominulis. Inflorescentiae ca. 3.5 cm. longae, terminales, axe minutissime puberulo; bracteis 3 mm. longis, 1.5–2 mm. latis, persistentibus, triangulari-ovatis, acuminatis, ciliolatis, intus glabris, extus minuto-puberulis; bracteolae 17 mm. longae, 6.5 mm. latae, obovatae, rotundato-obtusae, coriaceae, concavae, intus glabrae, extus sparse minutissimeque puberulae vel glabrae. Hypanthium 14 mm. longum, stipite 4.5 mm. longo, glabrum, carnosum. Sepala 20–22 mm. longa, 4.5–7 mm. lata, oblonga, obtusa, concava, carnoso-coriacea, glabra. Petalus 28 mm. longus, 12 mm. latus, lanceolatus, sessilis, glaber. Filamenta 27 mm. longa, basim versus pilosa, antherae oblongae, 9–10 mm. longae, 2.5 mm. latae. Stigma capitatum. Stylus ca. 21 mm. longus, glaber. Ovarium 5–7 mm. longum, 2 mm. latum, oblongum, marginibus sparse puberulis sed lateraliter glabrum, 5-ovulatum, gynophori parte libera 5 mm. longa. Fructus ignotus.

Type Collection: *W. A. Archer 2020*, "Intendencia del Choco: Quibdó, Río Atrato; altitude about 60 meters," Colombia, April–May 1931 (HOLOTYPE US, fragmentary isotype NY).

Additional Specimens: COLOMBIA: Río Atrato, Quibdó, Intend. del Choco, April–May 1931, *Archer 2023* (US); Río Calima (region del Choco), La Trojita, 5–50 m. alt., Feb.–March 1944, *Cuatrecasas 16309* (F); Córdoba, valley of Río Dagua, Dept. El Valle, Oct. 1922, *Killip 11852* (NY, US); south of Río Condoto, between Quebrada Guarapo and Mandinga, Intend. El Choco, April 1939, *Killip 35433* (US); Puerto de Buenaventura, April 1833, *Triana s.n.* (COL); Port de Buenaventura, 1851–57, *Triana s.n.* (P).

Both morphologically and geographically the nearest relative of this species is the Panamanian species *M. pittieri*. The sessile petal of *M. archeri* is much smaller than that of its relative; it has a very much stouter hypanthium, which is longer; its bracteoles are considerably larger and puberulous on the outer surface; the leaflet apex of *M. archeri* is bluntly acuminate but it is caudate-acuminate in *M. pittieri*. All these differences add up to a marked series of distinctions between the two species.

All the material cited above had been identified previously as *M. floridum*, which, while closely related, is quite different, judging from the meagre data available. *M. floridum* exhibits the following differences: (1) acute leaflet apices rather than acuminate; (2) a longer inflorescence; (3) sepals about 10 mm. long as compared to 20 mm.; and (4) a pubescent hypanthium.

The new species is named in honor of the collector of the type material, W. A. Archer, Curator of the Herbarium of the Bureau of Plant Industry at Beltsville, Maryland, and collector of note in northern South America.

48. **Macrolobium pittieri** (Rose) Schery, Ann. Mo. Bot. Gard. **38**: 33. 1951. Figure 12.

Vouapa Pittieri Rose, N. Am. Flora **23**: 226. 1930.

Branchlets glabrous. *Petioles* 3–6 mm. long, glabrous. *Leaflets* 28–32.5 cm. long, 8.5–11 cm. wide, sessile, subequilateral, oblanceolate, the base inequilateral, the lower side obtuse and much wider than the acute upper side, the apex caudate-acuminate, the margin entire or irregularly undulate; upper surface glabrous, very minutely puberulous beneath on the costa and the primary veins, epunctate; costa salient above, the costa and primary veins salient beneath, the venules prominulous above, conspicuous beneath. *Inflorescences* to 3.5 cm. long, glabrous, the bracts 2.5 mm. long, 1 mm. wide, triangular, the pedicels about 4.5 mm. long; bracteoles 12 mm. long, 4 mm. wide, oblanceolate, concave, rounded-obtuse, glabrous. *Hypanthium* 10 mm. long on a 3 mm. stipe, glabrous. *Sepals* 17–18.5 mm. long, 4 mm. wide, oblong, obtuse, concave, sparsely and irregularly ciliolate, otherwise glabrous. *Petal* blade 42 mm. long, 15 mm. wide, elliptic, the claw 5 mm. long, glabrous externally, sparsely pilosulose within on the lower half of the costa. *Filaments* about 25 mm. long, villose basally, the anthers 5 mm. long, 2 mm. wide. *Stigma* capitate. *Style* 24 mm. long, pilosulose basally. *Ovary* 3–4 mm. long, 1–1.5 mm. wide, oblong, pilosulose on the margins, laterally glabrous, 6-ovulate; free portion of the gynophore 2 mm. long, pilosulose adaxially. *Fruit* glabrous, the seeds 3–3.5 cm. long, 2.5 cm. wide, obovate, the testa very membranous and venulose.

Type Collection: *H. Pittier 4355*, "Plain of Sperdi, near Puerto Obaldía, San Blas coast; near sea level," Panama, Sept. 1911 (HOLOTYPE US, isotypes F, GH, NY).

One might expect that this species would show greater relationship to the other Panamanian species than to any other. Such is not the case, however, for it is much more nearly allied to *M. archeri* of Colombia. From the latter it may be separated by its unguiculate, larger petal, its shorter hypanthium, its smaller glabrous bracteoles, and its caudate-acuminate leaflet apices.

Pittier published a description of *M. floridum* based on the specimen cited above (Contr. U. S. Nat. Herb. **18**: 233. 1917) but Rose recognized that the material actually represented a new taxon. Consequently, he described it as a new species, basing it on Pittier's collection and naming it for the collector. It rested under the generic name *Vouapa* until Schery transferred it to the proper genus in 1951.

SPECIES DUBIA

1. **Vouapa simira** Aubl. Pl. Guian. **1**: 27, *pl. 8*. 1775.

Vouapa violacea Lam. Encycl. 97. 1791.
Macrolobium Simira (Aubl.) Gmel. Syst. Nat. ed. 13. 2: 93. 1796.
Macrolobium sphaerocarpum Willd. Sp. Pl. 1: 186. 1797.

Aublet's plate representing this species shows unijugate leaves, the leaflets of which are equilateral and petiolulate. In addition to the foliage, only a single legume was depicted and this was orbicular in outline. The only recognized species possessing such leaflets is one from central Brazil, *M. arenarium*. In contrast to the orbicular legumes shown in Aublet's figure, the fruits of *M. arenarium* are elongate-oblong.

An isotype of *Vouapa simira* Aublet has been studied at the British Museum (Natural History) and I am certain that it represents no recognized species of *Macrolobium.*

NUMERICAL LIST OF TAXA

1. *M. taxifolium*
2. *M. gracile*
   a. var. *confertum*
   b. var. *machadoense*
   c. var. *debile*
   d. var. *gracile*
3. *M. machaerioides*
4. *M. brevense*
5. *M. huberianum*
   a. var. *pubirachis*
   b. var. *huberianum*
6. *M. longipedicellatum*
7. *M. longeracemosum*
8. *M. acaciaefolium*
9. *M. froesii*
10. *M. venulosum*
11. *M. flexuosum*
   a. var. *flexuosum*
   b. var. *parviflorum*
12. *M. furcatum*
13. *M. molle*
14. *M. jenmanii*
15. *M. discolor*
   a. var. *discolor*
   b. var. *caudiculatum*
   c. var. *egranulosum*
16. *M. multijugum*
   a. var. *multijugum*
   b. var. *sinuatum*
17. *M. microcalyx*
18. *M. montanum*
   a. var. *montanum*
   b. var. *potaroanum*
19. *M. urupaense*
20. *M. guianense*
21. *M. campestre*
   a. var. *arboreum*
   b. var. *medium*
   c. var. *campestre*
   d. var. *arirambense*
   e. var. *longibracteatum*
22. *M. arenarium*
23. *M. canaliculatum*
24. *M. punctatum*
25. *M. unijugum*
   a. var. *fanshawei*
   b. var. *mucronatum*
   c. var. *unijugum*
26. *M. klugii*
27. *M. bifolium*
28. *M. latifolium*
29. *M. angustifolium*
30. *M. retusum*
31. *M. duckeanum*
32. *M. amplexans*
33. *M. suaveolens*
   a. var. *pakarimense*
   b. var. *rondonianum*
   c. var. *petiolatum*
   d. var. *uaupesense*
   e. var. *suaveolens*
34. *M. parvifolium*
35. *M. palustre*
36. *M. savannarum*
37. *M. pendulum*
38. *M. stenopetalum*
39. *M. stenosiphon*
40. *M. colombianum*
   a. var. *monagasense*
   b. var. *metaense*
   c. var. *ocumarense*
   d. var. *bicuspidum*
   e. var. *colombianum*
41. *M. trinitense*
42. *M. stenocladum*
43. *M. ischnocalyx*
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A REVISION OF THE GENUS BRACHYOTUM (TIBOUCHINEAE-MELASTOMACEAE)[1]

JOHN J. WURDACK

INTRODUCTION

Brachyotum is the second-largest genus of the tribe Tibouchineae (Melastomaceae), exceeded in number of species only (and dwarfed) by *Tibouchina.* All species of *Brachyotum* are endemic to the Tierra Fria and upper Tierra Templada (Pennell 1951) of the Andes from north central Colombia (Dept. Antioquia) to extreme northwestern Argentina (Dept. Jujuy), generally at altitudes of 2000 to 4000 meters. The ecologic niches occupied by the various species are: the "páramo" and "páramillo" (subpáramo) regions of Colombia and Ecuador; the "monte" ("ceja de la montaña," "monte de arroyada," and the lower margins of the "pajonales") of Peru (Weberbauer 1945); and the "Ceja" and "Bergwiesen" of Bolivia and northwestern Argentina (Herzog 1923). Specific ranges are in general quite limited. Three species are found only in Colombia, two in Colombia and northern Ecuador, sixteen only in Ecuador, twenty-one only in Peru, two in southeastern Peru and northwestern Bolivia, and one from northern Bolivia to extreme northwestern Argentina. No species has crossed the Olmos break (Pennell 1951) in northern Peru; indeed, the species found immediately on either side of this break, although generally related, are more abundantly distinct than members of some species-pairs with very great geographical disjunctions (cf. *B. cernuum* and *B. grisebachii*).

NOMENCLATURAL HISTORY

Brachyotum was established as a genus by Triana (1867) to include *Arthrostemma* sect. *Brachyotum* DC. and various species previously ascribed to *Chaetogastra* DC. and *Rhexia* L. Triana (1871) recognized 28 species in the first treatment of the genus. The earlier disposition of the species described before Triana's revision of the family has an involved history correlated with the confusion in generic delimitations up to that time. There are no problems, however, in the nomenclature of any species published by taxonomists before A. P. de Candolle.

Chaetogastra DC. (Candolle 1828a) included species now assigned to *Meriania* (Swartz 1800), *Tibouchina* including *Purpurella* (Aublet 1775), *Desmocelis* (Naudin 1849), *Pterogastra* (Naudin 1849), and *Pterolepis* (Miquel 1840; nom. conserv.), as well *Brachyotum strigosum*, *B. cernuum*, *B. canescens*, and *B. confertum.* To obviate any further use of *Chaetogastra* DC. (which might cause nomenclatural changes in any of the several genera published subsequently to 1828 and whose names have not been conserved), *Chaetogastra longifolia* (Vahl) DC. is here designated as the type of this genus, since this species is now universally placed in *Tibouchina. C. longifolia* was placed by de Candolle in the section of the genus which he characterized as "les vrais Chaetogastra" (1828b). With this typification, *Chaetogastra* DC. p.p. becomes a synonym of *Tibouchina*, and the validity of the names of later genera based on various species formerly placed there need not be questioned. Subsequent alteration of the circumscription of *Chaetogastra* by Naudin (1850) need not be considered here.

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Arthrostemma Pavón ex Don (1823) included present-day species of *Arthrostemma*, *Monochaetum*, and *Oxyspora*. De Candolle (1828a) separated the genus from *Chaetogastra* on the basis of its 4- rather than 5-merous flowers; in his amplification and modification of the circumscription of *Arthrostemma*, he included there species now placed in *Arthrostemma*, *Pterolepis*, *Castratella*, *Tibouchina*, *Comolia*, *Monochaetum*, and *Brachyotum*; *Arthrostemma* sect. II *Brachyotum* DC. comprised four species, all now placed in *Brachyotum*, and one of which has been designated in the current treatment as the genotype.

Pleroma D. Don (1823) was composed entirely of species subsequently placed in *Tibouchina* by Cogniaux (1891); De Candolle (1828a) altered the circumscription of the genus in several respects and included questionably the *Brachyotum* species described by Desrousseaux as *Melastoma ledifolium*. Using Cogniaux's circumscription of *Tibouchina*, the changes in delimitation of *Pleroma* by Naudin (1849) and Triana (1867, 1871) do not affect the status of the generic name *Brachyotum*. Naudin placed the Desrousseaux species in *Lasiandra* DC.; in this genus, De Candolle had included only species which were later placed by Cogniaux in *Tibouchina*, so again Triana's generic name is not affected nomenclaturally.

Bonpland (1806–1823) lumped all the melastome species described by him into two genera; the species later transferred to *Brachyotum* (by Triana) were placed in the genus *Rhexia*. Rafinesque (1838) proposed the genus *Bolina* to replace *Bertolonia* Raddi (1820) non Raf. (1818); he also transferred to *Bolina* species now placed in *Pterogastra* and *Centronia*, as well as *Rhexia (Brachyotum) conferta* Bonpl. *Bolina* should be typified by one of Raddi's species of *Bertolonia* (Lanjouw et al. 1952, App. I), and hence is superfluous, since Raddi's generic name has been conserved (Lanjouw et al. 1952, p. 123). In addition, the calyx of *Brachyotum confertum* does not conform to Rafinesque's description of "angular 5-gonus" so this species would not be used to typify *Bolina* if only Rafinesque's comments, and not the synonymy listed by him, were considered.

Rafinesque in the same publication added further complications to the validity of the generic name *Brachyotum* by employing the name "Alifana (Ad)" and referring there "all the decandrous Rhexias or A. canescens, striata, lutescens, montana Raf. (Rhex. polypetala R.P.)&c." *Alifana* may be rejected on two lines of reasoning: (1) In referring to Adanson, Rafinesque was using a variant of Adanson's genus *Alifanus* which was illegitimate since it was superfluous when published (Lanjouw et al. 1952, Art. 73). Adanson (1763) included *Rhexia L.* under *Alifanus* Pluk. Plukenet's name is pre-Linnean (1705) and Adanson therefore, from a modern viewpoint, should have used the Linnean *Rhexia* as the generic name; in this connection, it should be noted that this publication of Plukenet was reprinted in 1769, with the addition of another title page in front of the original one, but this is not considered to constitute post-Linnean publication. (2) *Alifana*, if published by Rafinesque, would be illegitimate since it would be a later homonym of *Alifanus* Adans. which was based on a different type (Lanjouw et al. 1952, Art. 74). But in fact, Rafinesque was not using a new name for the genus, as is shown by his discussion under the genus and his not giving the derivation of the name as he usually did for genera he was proposing. Any other interpretation of this nomenclatural problem would make necessary a proposal for conservation of *Brachyotum* as a generic name since three of the species referred to *Alifana* by Rafinesque are currently placed in *Brachyotum*; the fourth, "montana Raf." is a dubious reference, perhaps to *Rhexia polystachya* Bonpl., since there is no "Rhex.

polypetala R.P." *Rhexia polystachya* is now referred to *Aciotis* as *A. polystachya* (Bonpl.) Triana.

The only complete treatment of *Brachyotum* subsequent to that of Triana was by Cogniaux (1891) who recognized 32 species. Cogniaux, Danguy and Chermezon, Gleason, Macbride, and Markgraf all described additional species after 1900, bringing the total number up to 45. In the present treatment, synonymization, coupled with the proposal of several additional species, leaves this total unchanged. The only extensive regional treatment of the genus was that of Macbride (1941) who tabulated and keyed the Peruvian species.

COLLECTIONS, TYPIFICATIONS, AND PUBLICATIONS

The establishment of the place of collection and place of deposition of most of the type collections of species of *Brachyotum* has usually not been difficult; however, several such problems have not been satisfactorily solved. Killip (1932) has indicated the problems inherent in establishing the localities of many Lobb collections; the Lobb specimen of *B. tyrianthinum* (K) although labeled "Columbia" is certainly from central Peru, and his "Peru" collection of *B. fictum* (W) probably came from near Cuenca, Ecuador, where he is known to have stayed for some time. Several André collections (*B. andreanum*, *B. rotundifolium*) probably came from southern Ecuador, but the definite localities could not be established; Dr. McVaugh orally confirmed the assumption that most of the André collections with numbers above 4000 were from this area. Ruiz and Pavón never visited Ecuador but one of their collectors, Juan Tafalla, was sent there (Diels 1937, Ruiz 1940); the Herb. Ruiz and Pavón specimens of *B. ledifolium* (F) and *B. alpinum* (F) are probably Tafalla collections. Dombey collections (as in *B. rostratum*) may also be found mixed with those of Ruiz and Pavón (Deleuze 1806). A series of Jameson specimens (US) are annotated (in an unfamiliar script) "No. — of a set of specimens taken out and numbered by Dr. Gray for Cogniaux," and a partial duplicate set (labeled as received from Asa Gray) is in the Cogniaux herbarium (BR); a few of these specimens have also been seen from Wien. No connection between Gray and Jameson has been established; unfortunately these specimens were very poorly sorted, with several species often mounted on the same sheet, and the localities were not given. Species seen from these collections included *B. benthamianum*, *B. campanulare*, *B. trichocalyx*, *B. andreanum*, and *B. campylanthum*; those of *B. campylanthum* and *B. trichocalyx* may well be parts of the type collections of those species, but evidence at present is too scanty for any conclusions.

Triana visited England at least twice before the publication of his monograph of the Melastomaceae, once in 1866-67 (Schumacher 1873, p. 397), and again in 1870 during the German occupation of France (Jackson 1906, pp. 218-219). It is probable that his conclusions on the species of *Brachyotum* were reached during the earlier visit, since he was awarded a prize for the familial monograph in September 1869 (Schumacher 1873, p. 401) and his paper was presented before the Linnean Society of London (in final form ?) by J. D. Hooker on March 21, 1867. Certainly his ideas concerning the validity of *Brachyotum* as a genus were crystallized during the earlier visit since the generic name was published in 1867. At this time he cited the number of species as 24, but the treatment in 1871 included 28. Triana's preliminary treatment of the family (1865) did not include *Brachyotum*. The Kew specimens apparently represent the holotypes of most of the species described by him in 1871. His annotations on these sheets are in pencil, with or without his initials "Tr." Triana was so erratic in citation of herbaria in his monograph that no reliance can be placed on the absence of such citations as indicating that the cited specimens are not these Kew sheets. Additional evidence for the validity of the Kew holotypes is the citation by Triana of such collectors as Pearce, McLean, Purdie, and Seemann, whose specimens were not widely distributed. Furthermore it is extremely improbable that a mixed collection on a single herbarium sheet corresponding so closely to Triana's description of *B. radula* (which covered the additional element *B. intermedium* Wurdack) would occur more than once.

In typification, it was also necessary to select lectotypes for the species based on Weberbauer collections destroyed at Berlin during the last war (Sleumer 1949). Cogniaux apparently kept a branchlet from each Weberbauer specimen upon which he based his new species. These rather fragmentary specimens from the Cogniaux herbarium (BR) were the only specimens seen that Cogniaux had annotated, and were therefore designated as the lectotypes (although by some they might also be regarded as the holotypes). However, better specimens (but not annotated by Cogniaux) of most of these collections were seen elsewhere (G-DEL). Cogniaux apparently saw all specimens of each number for the species described by him from André's collections. In such cases the Kew specimen has been regarded as the holotype, since the original André herbarium is housed there (Kew Bull. 1913: 59). In the citation of type photographs and place of deposition of probably extant holotypes, the word "presumably" has been employed to indicate all specimens not actually seen during this study.

The publication date of the first livraison (pp. 1-40, *pl. 1-15*) of Bonpland's *Rhexies* has not been definitely established other than 1808 or earlier, probably between 1806 and 1808 (Sherborn & Woodward 1901). In the *Rhexia* species involved in the current study, this date has been cited as 1806-1808.

ECONOMIC IMPORTANCE

The species of *Brachyotum* are of little economic significance. Poles of the wood of *B. ledifolium (Steyermark 52348)* are used for fences in Ecuador. Bonpland (1806-1808) reported that a decoction from *Rhexia canescens (B. ledifolium)* was used in Colombia for the treatment of urine retention and other disorders of the urinary system. The leaves and young shoots of *B. lindenii* (*Hartweg* 1003 p.p.) were used by the Indians on Pichincha as a purge. *B. naudinii (West 3662)* has been used as a remedy for diarrhea in Dept. Ayacucho, Peru. Ruiz and Pavón (1802) recorded the use of an extract (rose? or yellow? "luteo") from both *Rhexia rosmarinifolia (B. rosmarinifolium)* and *R. quinquenervis (B. quinquenerve)* in dyeing cloth. Jameson sent seeds of *B. confertum* from near Cuenca, Ecuador, to I. A. Henry of Edinburgh, who grew and flowered the species in his greenhouse; the illustrations in Curtis's Botanical Magazine (1873, *pl. 6018*) and Flore des Serres (1874, *pl. 2099*) were drawn from these plants. No other record of the use of *Brachyotum* in European floriculture has been found. However, Herrera (1941, p. 321) reported the use of *B. quinquenerve* as a garden ornamental in Dept. Cuzco, Peru.

GENERIC AND SPECIFIC RELATIONSHIPS

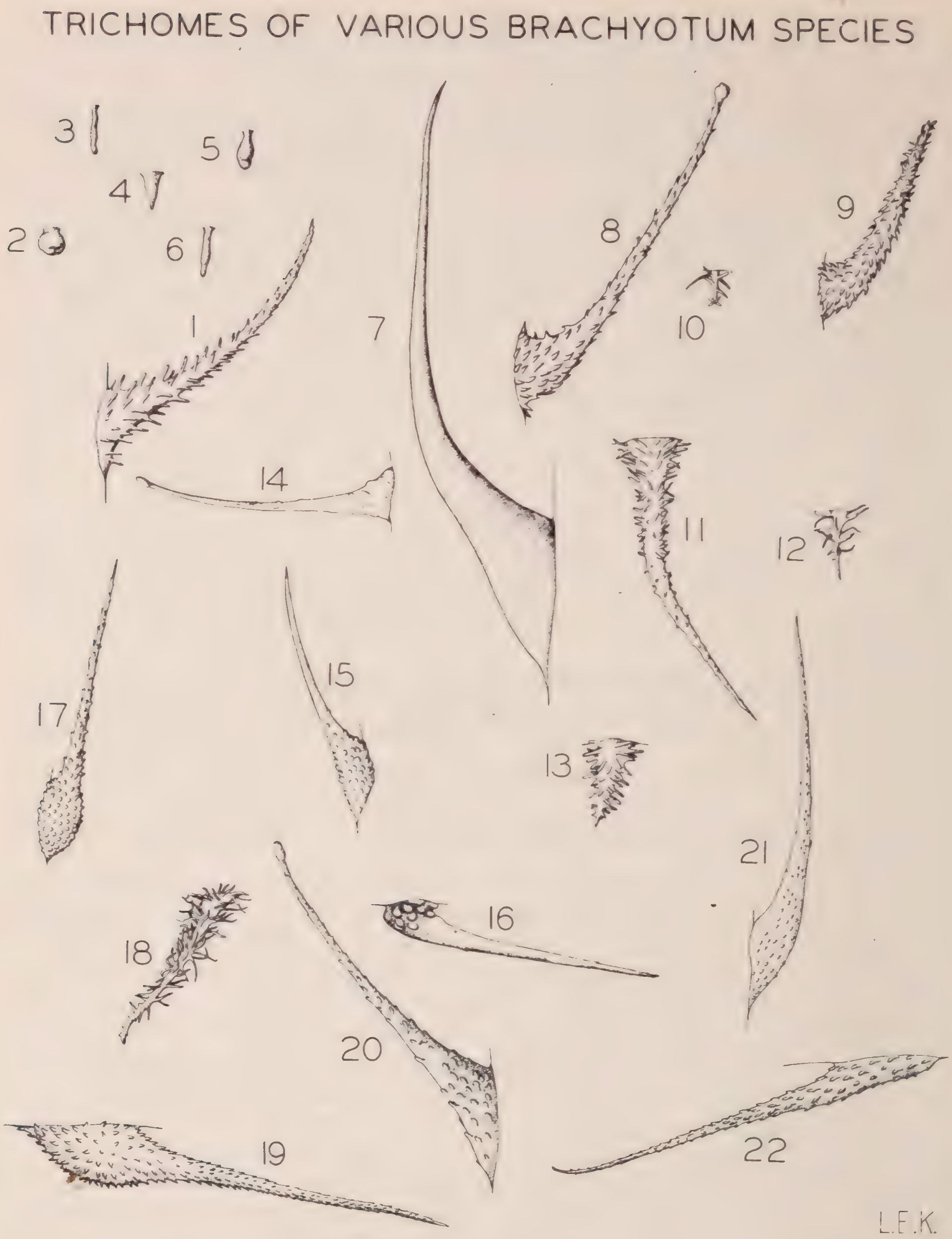
In keying a specimen of *Brachyotum* to genus in Cogniaux's treatment of the Tibouchineae (1891), the isomorphic stamens and setose ovary apices bring one at once to genera 24-31 of the conspectus. The campanulate corolla tube and pendent flowers are usually sufficient to eliminate all of these genera except *Brachyotum* from consideration, but these characters are sometimes not obvious on poor specimens. The "closed" nature of mature flowers of *Brachyotum* may be spotted by the exserted style; even in well-developed buds of specimens of related genera, the style is never exserted before the spreading of the petals. The smaller flowers of *Chaetolepis*, with the hypanthium usually not exceeding 3 mm. and the petals 8 mm. in length, and the peculiar pubescence of the calycine sinuses of *Pterolepis* may then serve as further distinctions. The characters noted in Cogniaux's key serve to eliminate all other genera of this group except *Svitramia* and *Tibouchina*. In *Svitramia* and almost all species of *Tibouchina* examined in the herbarium of the New York Botanical Garden or the descriptions studied, the connective is "prolonged" below the anther-thecae to the point of filament insertion; the ventral appendages of *Tibouchina* are thus neither in contact nor fused even partially with the thecae; the prolongation of the exappendiculate connective of *Svitramia* is obvious because of the "break" at the point of articulation of the filament. All species of *Brachyotum* with large persistent bracts closely investing the hypanthium would immediately be unsuitable in Cogniaux's key to the sections of *Tibouchina* because of habit or lack of lepidote pubescence. The 4-merous species of *Tibouchina* in sect. IX *(Pseudopterolepis)* all have connectives definitely (albeit often shortly) prolonged below the anther-thecae. In the 5-merous species of sect. VIII *(Diotanthera)*, unequal stamens and/or connective prolongation exclude all species except *T. mollis* (Bonpl.) Cogn. from *Brachyotum*. The petals in this species are obviously spreading; the connective however, even in well-developed anthers, may be very slightly prolonged below the thecae to the filament articulation or, more frequently, only very shortly prolonged ventrally immediately below and adherent to the thecae. *T. mollis* is a close approximation of an ancestral *Brachyotum*.

Ule (1895) distinguished between the subulate-tipped anthers of *Tibouchina* and *Brachyotum* and the truncate-tipped large-pored anthers of *Purpurella*. This distinction, however, is not valid for *B. lycopodioides* and its relatives. Ule likewise noted the campanulate "corolla-tube" of several Brazilian species of *Purpurella*. In all of these species of *Purpurella* however, the connective is prolonged below the thecae and points downward, rather than curving along the thecae bases as in *Brachyotum*.

Cogniaux's sectional criteria and key characters within his sections did not permit any natural grouping of the species of *Brachyotum*. Sections based upon the presence [sect. I. *Dicentrae* (Naud.) Cogn.] or absence [sect. II. *Adesmiae (Naud.)* Cogn.] of ventral prolongation of the connective at the anther base are apparently artificial; indeed, this distinction is often of dubious value even in specific delimitation. For the species presently known, the only natural subgeneric delimitation would appear to be the separation of the wide-pored species, but formal change has here been deferred. The species with large persistent bracts closely investing the hypanthium do not seem to form any natural unit. Formal specific changes, such as relegation to subspecific categories, have also been avoided until additional collections establish the best direction and degree of such dispositions (i.e., *B. lindenii* and *B. alpinum* and/or including *B. cernuum*; *B. figueroae*, *B. rostratum*, and *B. lutescens*; the possible varieties of *B. microdon*; and the possible varieties of *B. sanguinolentum*). The representation of supposed relationships between the species of *Brachyotum* (Fig. 24) has been limited to a drawing portraying only two instead of three dimensions, despite obvious inadequacies.

GENERAL MORPHOLOGY

Pubescence. The trichomes vary from perfectly smooth to remarkably shaggy-plumulose or nearly stellate. In those species having hairs roughened, the degree of development of the projection of the surface cells of the hairs varies with the location on the plant; the cauline, lower leaf surface, and hypanthial hairs are the


TRICHOMES OF VARIOUS BRACHYOTUM SPECIES
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L.F.K.

FIGS. 1–22. Trichomes of species of *Brachyotum.* FIGS. 1–6. *B. microdon (Balls B-6249* NY). FIG. 1. Hypanthial hair. FIGS. 2–6. Lower leaf surface glands. FIG. 7. *B. markgrafii* (*Pearce s.n.* K); hypanthial hair. FIG. 8. *B. cogniauxii* (*Pennell 15660* PH); hypanthial hair. FIGS. 9–13. *B. ledifolium* (Camp E-302 NY). FIG. 9. Hypanthial hair. FIGS. 10–13. Lower leaf surface hairs. FIGS. 14–16. *B. seorsum (Camp E-5161* NY*)*. FIGS. 14, 15. Hypanthial hairs. FIG. 16. Lower leaf surface hair. FIGS. 17–19. *B. maximowiczii* (*Pennell 15730* PH). FIG. 17. Hypanthial hair. FIGS. 18, 19. Lower leaf surface hairs. FIG. 20. *B. lutescens (Ruiz & Pavón s.n.* G-DEL*)*; hypanthial hair. FIGS. 21, 22. *B. lycopodioides* (*Pennell 15854* PH). FIG. 21. Hypanthial hair. FIG. 22. Lower leaf surface hair. All hairs approximately ×30.

most obviously roughened, and those of the upper leaf surface and primary veins of the lower leaf surface the least. The individual hair has the greatest development of roughening basally, the least apically. The bases of the hairs are more or less "adherent" to the leaf surface, actually being subepidermal, and are sometimes radicine; the adherence is best developed in the trichomes of the upper leaf surface. Calcium oxalate deposits can be seen in the hair bases as round white dots; these deposits have also been occasionally observed, apparently subepidermally, on the hypanthium. The trichomes are sometimes on low to well-developed callosities (best developed on the upper leaf surface) which are usually distinguishable from the hair bases. Well-developed callosities (tubercles) are often in regular lines on the upper leaf surface; the number of these longitudinal rows at the widest part of the leaf blade has been utilized as a diagnostic feature. The hairs sometimes have swollen (glandular) tips, the frequency of occurrence of such hairs varying with location on the plant; the petal cilia are the most frequently gland-tipped, followed by the hypanthial, lower leaf surface, and stem hairs; the maximum development occurs in *B. lutescens* where even the upper leaf surface hairs are sometimes glandular. Small, few-celled, brownish, short- to elongate-clavate glands, mostly 0.05–0.15 mm. long, are always present on the lower leaf surface. These glands occur singly or in clusters of up to ten; the clusters are often at the bases of hairs and with age often turn black, forming irregular "punctae." The glands also generally occur sparsely on the hypanthium and calyx, being especially noticeable in the axils of the sepal cilia, and only rarely and sparsely on the upper leaf surface. Pflaum (1897) studied in detail the anatomy of the leaves and pubescence of the Tibouchineae and Microliciae; his discussion and drawings of various genera well mirror the range of variation in melastome hairs. Trichomes of various species of *Brachyotum* are illustrated in Figures 1–22 of the present revision.

The hairs are most frequently appressed, sometimes patent; the degree of appression or patency is probably environmentally determined and is not a reliable diagnostic feature. The term "strigose" has been limited to pubescence of appressed trichomes averaging more than 1 mm. long; "short-strigose," 1–1.5 mm.; "strigulose," less than 1 mm.; "long-strigulose," 0.5–1 mm.; and "short-strigulose," less than 0.5 mm. Patent (spreading) pubescence has been described as "hirsute," "hirsutulous," "setose" (with stout stiff hairs), or "setulose," the sizes of these hairs being indicated in the individual descriptions.

Habit and Branching. All species are low shrubs or shrubby trees 0.5–8 m. tall, with the branching loose to fastigiate. The young branchlets are obscurely to markedly quadrangular, becoming rounded with age. The branchlets decorticate in about the third growth season, an inner tan to red-brown cork then being exposed.

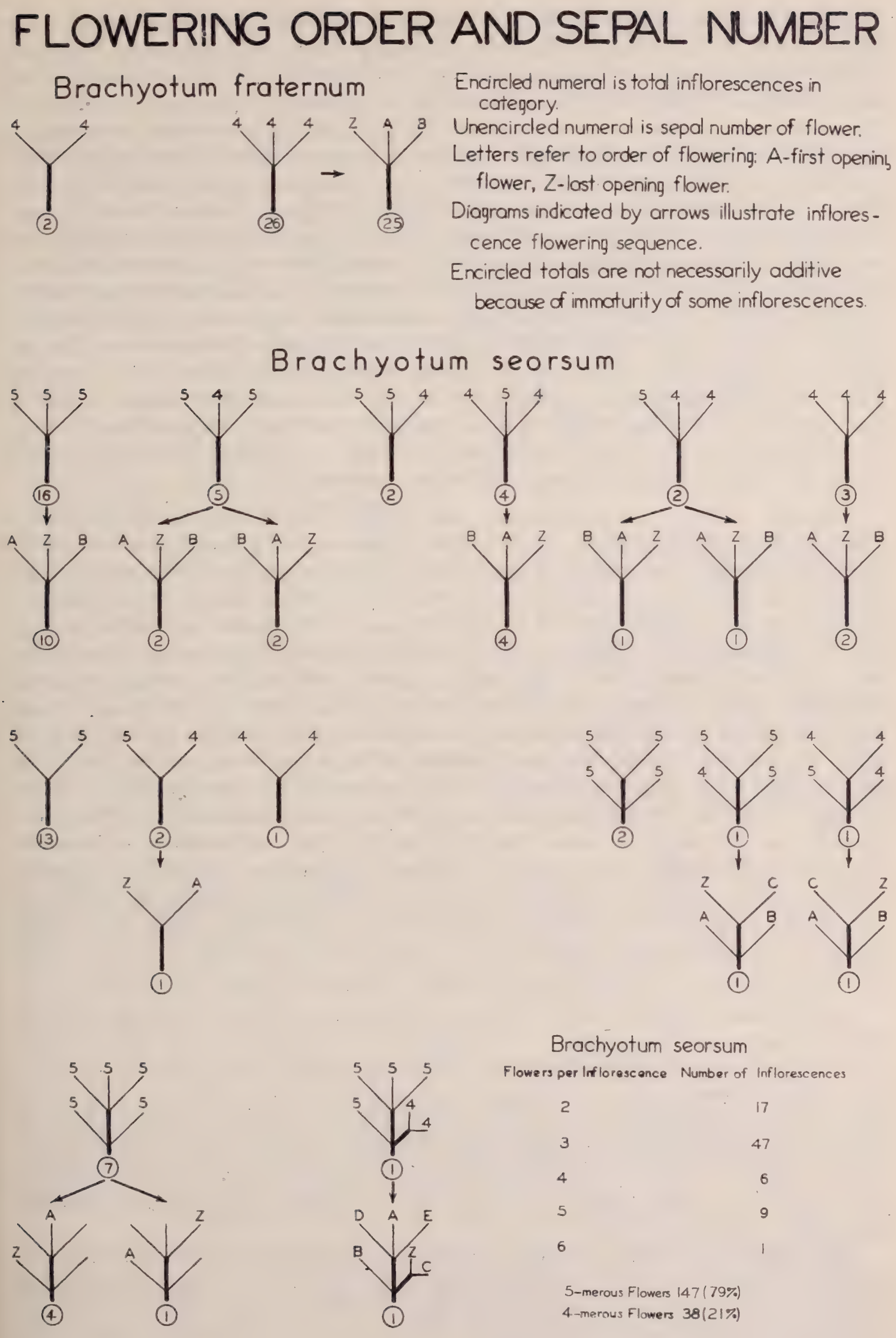
Leaves. Petioles are canaliculate, with pubescence the same as that of the branchlets but generally shorter or lacking on the upper surface. The only dimension cited for petioles in the specific descriptions is the length.

Blades vary in texture from chartaceous *(B. gracilescens, B. rugosum,* part of *B. microdon)* to thick-coriaceous or thick-brittle; the margins are usually conspicuously recurved, except in the thin-leaved species. The longitudinal conspicuous veins (primaries) range in odd number from three to seven; sometimes there is an additional pair of indistinctly developed submarginal veins (marginals), formed by coalescence of the ascending ends of the secondaries. Secondaries are usually inconspicuous and rather irregular, sometimes conspicuously reticulate. The primaries are impressed above and elevated below, the secondaries inconspicuously so. The area along the veins on the upper leaf surface is less pubescent than the surface proper; the pubescence is parted along the midrib. The blade edges are always appressed-ciliate, usually with the same type of trichome as the upper leaf surface; aside from the indentations for these marginal trichomes, the margins are entire. Unless otherwise stated in the specific description, the density and quality of the pubescence have been described from the surface hairs and not from those on the veins. In the description of leaves and other organs, the term "acute" has been restricted to angles of less than 90°, "obtuse" to angles of 90°-180°, and "truncate" to 180°.

Inflorescence. The flowers are solitary or in 2-3-flowered dichasia, the dichasia sometimes being aggregated into panicles or corymbs. The solitary flowers arise from pedicels or short branchlets in the upper leaf axils or on short branches. Often these solitary flowers are in opposite upper leaf axils, and thus "paired," but terminal vegetative growth usually leaves no doubt of their placement in the solitary-flowered category in the species key. However, the basic and most common inflorescence unit of the genus is the 3-flowered dichasium subtended by leaves or variously reduced bracts or bracteoles; the next-lower node below that of the dichasium often has two solitary flowers (occasionally also even the node below this one). The peduncle, as herein used, bears a group of several flowers, the pedicel a single, either solitary or dichasial flower. The peduncle is sometimes differentiated from, and much more slender than, the supporting branchlet, and then is pendent. In those species with a terminal dichasium and a pair of solitary flowers at the node below, the peduncle has been measured from this node to the dichasial node. Usually two opposite bracteoles are inserted on the flower pedicel, rarely, in a dichasium, lacking. Whether these bracteoles are to be interpreted as of a different order from bracts or leaves is a debatable point; all gradations can be found from obvious and persistent leaves, as in some solitary-flowered species, to minute linear caducous bracteoles. Whether the inner pair of large bracts closely investing the hypanthium of some species are modified pedicellar bracteoles or directly modified leaves, with the true pedicellar bracteoles eliminated by compression of the flower branchlet apex, is another unsettled question. In those species with well-developed peduncles, the center flower of the perfect (3-flowered) dichasium sometimes aborts; such abortions are obvious in Figure 23.

Mery. The flowers are 4- or 5-merous, with very rarely a teratologic 6-merous flower on an otherwise normal specimen. The stamens are $2n$; the sepals, petals, and carpels, n. Because of the limited number of flowers available for dissection, the predominant mery in each species was determined by sepal number; fusion of two calyx lobes has been observed very rarely, and then such fusions were obvious from the size of the lobe. Generally the change from 5-mery to 4-mery is abrupt, with the hypanthial ribbing agreeing with the sepal-mery; no obvious intermediates were seen in extensive collections under one field number, such as the large series available from several W. H. Camp collections. An analysis of the relation of mery (sepal number), order of flowering, and position of the flower in the inflorescence is presented in Figure 23 for two of these large collections, *Camp E-4871 (B. fraternum)* and *Camp E-5161 (B. seorsum)*. From the data presented for *B. seorsum*, it can be seen that there is no absolute positional correlation with either mery or order of flowering in this species; for the constantly 4-merous species, *B. fraternum*, the center flower of the dichasium was the first-opening in all observable inflorescences.

In the delimitation of species, mery has been used to separate closely related populations in several instances. It is possible or even probable that such pairs as *B. alpinum* and *B. lindenii*, *B. rostratum* and *B. lutescens*, or the 4- and 5-merous elements of *B. naudinii* will eventually be treated as subspecies.


Brachyotum fraternum
4 4
②
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Z A B
㉕
Brachyotum seorsum
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⑯
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A Z
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FLOWERING ORDER AND SEPAL NUMBER

Encircled numeral is total inflorescences in category.

Unencircled numeral is sepal number of flower.

Letters refer to order of flowering: A-first opening flower, Z-last opening flower.

Diagrams indicated by arrows illustrate inflorescence flowering sequence.

Encircled totals are not necessarily additive because of immaturity of some inflorescences.

Brachyotum seorsum

Flowers per Inflorescence	Number of Inflorescences
2	17
3	47
4	6
5	9
6	1

5–merous Flowers 147 (79%)
4–merous Flowers 38 (21%)

FIG. 23. Flowering order and sepal number in *Brachyotum*.

Hypanthium and Calyx. The hypanthium is more or less campanulate. The ribs, scarcely visible externally, are 2*n* in number and run to the torus. The term "torus" is here used in the sense of Gleason (1939) as the ring of vascular tissue at the apex of the hypanthium upon which the petals and stamens are inserted. The sepals extend from the torus and are "united" above it to varying degrees; in the specific descriptions, the sepal lengths are measured from the torus, the widths from sinus to sinus; the "calyx lobes" are the free portions of the sepals. Both sepals and hypanthium are pubescent to varying degrees externally; the hypanthium is glabrous within, the sepals usually so except for a sparse sprinkling of inconspicuous minute appressed hairs which are similar to the glands of the lower leaf surface but more elongate. Occasionally the sepals are, as specifically noted, pubescent within apically. The marginal and external surface hairs of the sepals are usually developed to the same degree as the hypanthial pubescence. The sepals are imbricate in bud but usually not noticeably so at anthesis; in some species, however, imbrication at anthesis has been used as a key character. In fruit the sepal lobes become lengthened, twisted, and incurved; for species, such as *B. strigosum*, in which the sepals are imbricate at anthesis, this later growth markedly changes the sepal shape and obliterates the imbrication.

Corolla. As in all Melastomaceae, the petals of *Brachyotum* are right-contort. They never spread, remaining connivent and imbricate in a polypetalous tube which falls off as a unit after anthesis. Such a tube is not unique for the Melastomaceae, being found also in *Axinaea*, *Charianthus*, *Purpurella (Tibouchina) itatiaiae* Wawra, and *P. hospita* (Schrank & Mart.) Krasser. The petals are rather firm in texture, obovate, and asymmetrical to varying degrees. The apices range from acute to obtuse to truncate or obliquely truncate. In the acute, obtuse, and symmetrically truncate petals, the midvein traverses the length of the petal; in obliquely truncate petals, the midvein terminates along the oblique end of the petal rather than at the dimensional apex. Generally the petals are glabrous except for the marginal cilia; in a few instances, they are sparsely to moderately pubescent without. Cilia are developed in all species; in those described as with gland-tipped cilia, the larger terminal few cilia are apparently eglandular; in those described as eglandular, rarely a few of the basal cilia have inconspicuous heads; in some species, even the well-developed glandular tips are caducous before anthesis. The cilia extend to within a few millimeters of the base of the petal. Petal color is apparently quite specific; it ranges from deep purple or blue (almost black) to carmine or white with red margins to greenish-white or yellowish.

Androecium. Anthers and the upper portions of the filaments are inflexed in bud, becoming erect at anthesis. "Anthesis" as here used is the time at which this erection occurs, and the dimensions and shape of all inflorescence and flower organs have been based on this stage in development. The glabrous filaments are flattened dorso-ventrally, the cross section being a flattened triangle with the apex facing inward, lateral flanges being slightly developed at the base of the filament. There are one or two irregularly placed "nicks" on the inside of the filament where it is bent before anthesis. During anthesis, the filament elongates markedly.

The glabrous anthers are usually slightly arcuate and lanceolate, tapering from the bases of the thecae to the apical pore; in *B. lycopodioides* and its relatives, however, the anthers are short and oblyrate, with more or less flaring apices due to the large pores which are half or more as wide as the bases of the anthers. The anthers are two-celled and dehisce by an apical pore which apparently is open long before anthesis; each theca is rounded-elliptic in cross section. Frequently some flowers on an otherwise normal-flowered branch will have anthers variously shriveled or shrunken and obviously non-functional. Lagerheim (1899) commented on such abortions in *B. ledifolium*, as well as the floral adaptations for bird pollination in this species. The only dimension cited for filaments and anthers in the species descriptions is the length.

The connective is unprolonged or prolonged ventrally immediately below the anther into an appendage which curves along, and is for some distance adherent to, the lower edge of the anther. The length of this basal prolongation has been measured from the dorsal edge of the connective, where it bends inward at the point of articulation with the filament, to the ventral (adaxial or inner) end of the appendage; the length of the ventral portion of the connective which is free of the anther has also been cited. The ventral end of the appendage is bilobed to varying degrees; sometimes the lobing extends back dorsally beyond the point of adherence of the anther. The lobes may be rounded or irregularly lobulate; minute apiculi occur sporadically on these lobes. The dorsal end of the connective at the anther base frequently has a small nubbin where the curve of the dorsal edge of the anther meets the straight line of the filament. This nubbin is usually antrorse, rarely retrorse; it is of no taxonomic significance, being sporadically present or absent on anthers of the same flower.

Gynoecium. The style is usually exserted at anthesis and continues to increase in length even after the corolla drops, but is persistent for only a short time thereafter. Between the apical lobes of the ovary, it is slightly contracted; apically, usually inconspicuously, it tapers to the punctiform stigma, which is merely an inconspicuous grouping of glandular papillations at the tip of the style.

The ovary is inserted at the base of the hypanthium, being completely surrounded by but free from it. The apical portion of the ovary is always pubescent, with eglandular or gland-tipped hairs. The tops of the carpels are extended for varying distances above the tops of the locules. These "apical lobes" are sometimes not discernible, the distance cited in the specific description then being merely the thickness (0.1–0.3 mm.) of the carpel wall. Placentation is axile, with numerous ovules per locule.

Fruit and Seeds. The hypanthium and sepals in fruit are about one and one-half times as large as at anthesis. The dry capsule dehisces loculicidally. Usually more than 50 per cent of the seeds are obviously aborted; fertile seeds are cochleate, 0.4–0.9 × 0.25–0.6 mm., and pitted, 3–5 pits per 0.1 mm. No qualitative distinguishing characters are apparent in the seeds and paucity of material prohibited use, even if feasible, of size classes of seeds for specific differentiation.

ARRANGEMENT OF SPECIFIC DESCRIPTIONS

A standard order for the material embodied in the species descriptions has been followed: type of trichomes, vegetative features (branchlets, petioles, leaf blades), reproductive features (mery, inflorescence, hypanthium, sepals, petals, stamens, pistil). Following the description are:

1. Type collection and place of deposition of type material; type locality.
2. Type photographs, usually those of the Chicago Museum of Natural History series (F——), or those taken by H. A. Gleason at various European herbaria. Such photographs were available from several herbaria (F, GH, NY, US). In addition to the cited photographs, a new set of photographs of many of the types examined during the course of this study are deposited at the New York Botanical Garden.

3. Geographic and altitudinal range of the species, followed by specimens examined in addition to the type collection.

4. Vernacular names and sources of these names (usually specimen labels).

5. Discussion of the species.

The specimens have been cited geographically by country and province from north to south and west to east as follows:

COLOMBIA (Departments and Commissaries): Antioquia, Caldas, Cundinamarca, Valle, Tolima, Cauca, Huila, Nariño, Putumayo.

ECUADOR (Provinces): Carchi, Imbabura, Pinchincha, Cotopaxi, Napo-Pastaza, Bolívar, Tungurahua, Chimborazo, Guayas, Cañar, Azuay, Santiago-Zamora, El Oro, Loja.

PERU (Departments): Piura, Cajamarca, Amazonas, La Libertad, Ancash, Huánuco, Pasco, Junín, Huancavelica, Cuzco, Ayacucho, Apurímac, Puno.

BOLIVIA (Departments): La Paz, Cochabamba, Santa Cruz, Chuquisaca, Tarija.

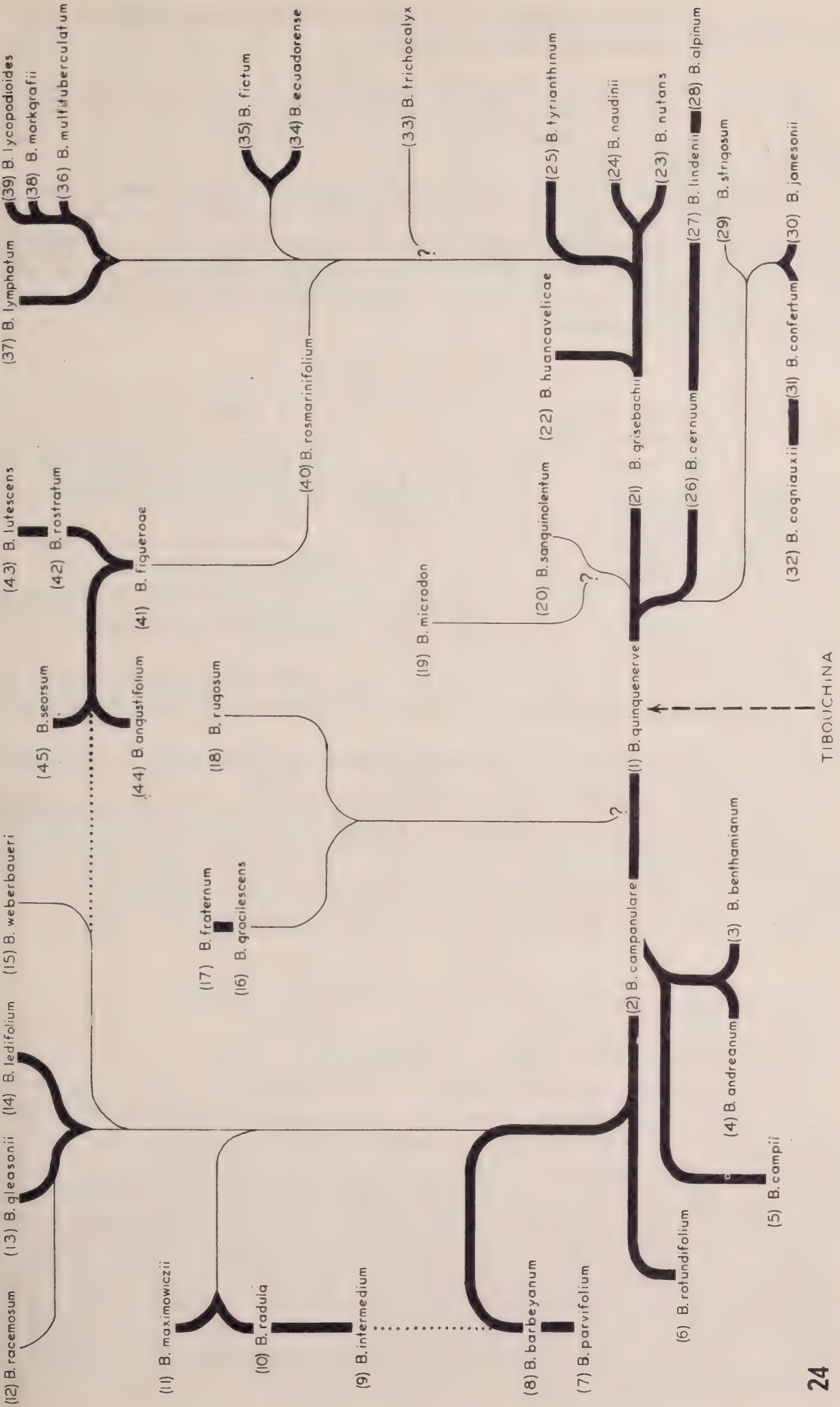
ARGENTINA (Provinces): Jujuy.

Only limited data for the exact locality of each collection within the province or department has been cited; this data is sufficient in most cases for the location of the place of collection by use of the American Geographical Society's index to their map of Hispanic America (1943) and the quadrangles of this map. Obscure localities in Ecuador have sometimes been found by use of Wolf's map of Ecuador (1892); other localities have usually been pinpointed by use of the references in the Barnhart Biographical Index of botanists in the library of the New York Botanical Garden. Complete names of collectors are given in the index to collections at the end of this study.

Herbaria are cited alphabetically, in accordance with the abbreviations of Lanjouw and Stafleu (1952) as follows:

A	Arnold Arboretum, Jamaica Plain, Mass.
BM	British Museum of Natural History, London.
BR	Jardin Botanique de l'État, Bruxelles.
F	Chicago Museum of Natural History.
G-BOIS	Boissier Herbarium, Genève.
G-DC	De Candolle Herbarium, Genève.
G-DEL	Delessert Herbarium, Genève.
GH	Gray Herbarium of Harvard University, Cambridge, Mass.
K	Royal Botanic Gardens, Kew.
L	Rijksherbarium, Leiden.
LE	Leningrad.
LIL	Instituto Miguel Lillo, Tucumán.
LINN	Linnean Society of London.
MA	Instituto "Antonio José Cavanilles," Madrid.
MICH	University of Michigan, Ann Arbor.
NA	United States National Arboretum, Beltsville, Md.
NY	New York Botanical Garden.
P	Muséum National d'Histoire Naturelle, Paris.
PH	Academy of Natural Sciences of Philadelphia.
S	Naturhistoriska Riksmuseet, Stockholm.
SI	Instituto de Botânica Darwinion, San Isidro, Argentina.
UC	University of California, Berkeley.
US	United States National Herbarium, Washington, D. C.

FIG. 24. Suggested relationships in *Brachyotum*. Heavy lines indicate close affinity; numbers are those used in the systematic treatment.


(39) B. lycopodioides
(38) B. markgrafii
(36) B. multituberculatum
(37) B. lymphatum
(35) B. fictum
(34) B. ecuadorense
(33) B. trichocalyx
?
(25) B. tyrianthinum
(24) B. naudinii
(23) B. nutans
(28) B. alpinum
(27) B. lindenii
(29) B. strigosum
(30) B. jamesonii
(22) B. huancavelicae
(21) B. grisebachii
(26) B. cernuum
(31) B. confertum
(32) B. cogniauxii
(40) B. rosmarinifolium
(43) B. lutescens
(42) B. rostratum
(41) B. figueroae
(19) B. microdon
(20) B. sanguinolentum
?
(45) B. seorsum
(44) B. angustifolium
(18) B. rugosum
(1) B. quinquenerve
TIBOUCHINA
?
(15) B. weberbaueri
(17) B. fraternum
(16) B. gracilescens
(2) B. campanulare
(3) B. benthamianum
(4) B. andreanum
(14) B. ledifolium
(13) B. gleasonii
(12) B. racemosum
(5) B. campii
(6) B. rotundifolium
(11) B. maximowiczii
(10) B. radula
(9) B. intermedium
(8) B. barbeyanum
(7) B. parvifolium

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USM	Herbario San Marcos, Museo de Historia Natural, Lima.
W	Naturhistorisches Museum, Wien.

The entire collection of each number collected by W. H. Camp and his assistants in Ecuador has been available for study; the duplicates from these collections will be widely distributed in the near future, but only the New York specimen has been herein cited.

All measurements have been cited in millimeters or decimals thereof and were made with a Spencer stereoscopic microscope (No. 23), using both a linear eyepiece scale and an eyepiece reticule. In all coupled dimensions the length is given first, followed by the width or diameter. Solitary dimensions, unless otherwise qualified, are of length. It should again be emphasized that all flower dimensions are those at anthesis.

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Miss Lucille Kopp, who patiently drew the trichomes in Figures 1–22.

SYSTEMATIC TREATMENT

Brachyotum (DC.) Triana; Benth. & Hook. Gen. Pl. 1: 743. 1867.

Arthrostemma sect. II. Brachyotum DC. Prodr. 3: 136. 1828.
Chaetogastra DC. Prodr. 3: 131, p.p. typ. excl. 1828.

Shrubs or shrubby trees, with more or less quadrangular, pubescent, decorticating branchlets. Trichomes smooth to very shaggy, sometimes gland-tipped. Leaves isomorphic, variously pubescent or tuberculate to nearly glabrous. Flowers 4–5-merous, pendulous, solitary or in 2–3-flowered dichasia, the dichasia sometimes aggregated into panicles or corymbs. Hypanthium campanulate, sometimes closely invested by one or several pairs of large persistent bracts. Sepals usually erect, without exterior teeth. Petals free but connivent and imbricate in a campanulate tube, usually glabrous except for the cilia. Stamens 8 or 10, isomorphic, glabrous; anthers lanceolate to oblyrate, uniporose; connective at the anther base exappendiculate, or ventrally prolonged immediately below and partially adherent to the thecae into a more or less bilobed appendage. Style slender, usually glabrous, usually exserted at anthesis; stigma punctiform; ovary free, 4- or

5-celled, pubescent apically with apical lobes more or less developed above the locules; ovules axile, numerous. Fruit capsular, dry, loculicidal; seeds cochleate, pitted.

Genotype: *Brachyotum quinquenerve* (R. & P.) Triana.

Key to the Species of *Brachyotum*

1. Flowers mostly in 2–3-flowered dichasia, the dichasia sometimes aggregated in corymbose or paniculate inflorescences. .... 20.
1. Flowers mostly solitary, on short branchlets or in opposite upper leaf axils of branchlets. .... 2.
2. Hypanthium not invested by pedicellar bracts or bracteoles, these smaller than leaves. .... 7.
2. Hypanthium closely invested by two or more pedicellar bracts which are persistent at least until anthesis and often as large or larger than leaves. .... 3.
3. Hypanthial trichomes notably roughened; calyx lobes moderately glandular-strigulose within. .... 32. *B. cogniauxii.*
3. Trichomes smooth; calyx lobes glabrous within. .... 4.
4. Style densely incurved-puberulous on basal 1/3, not exserted at anthesis. .... 5. *B. campii.*
4. Style glabrous, exserted at anthesis. .... 5.
5. Leaf blades 11–16 × 7–12 mm., with 5 primary veins. .... 4. *B. andreanum.*
5. Leaf blades 6–12 × 3–6 mm., with 3 primary veins. .... 6.
6. Flowers predominantly 5-merous; floral bracts densely sericeo-strigose without; ovary trichomes gland-tipped. .... 31. *B. confertum.*
6. Flowers predominantly 4-merous; floral bracts medianly moderately strigulose but marginally nearly glabrous without; ovary trichomes non-glandular. .... 30. *B. jamesonii.*
7. Leaf blades above glabrous to sparsely, moderately, or densely strigulose or short-strigose; if less than 10 mm. long, glabrous or sparsely strigulose. .... 9.
7. Leaf blades above densely tuberculate, 4–7 mm. long (flowers 5-merous; petals deep purple, with non-glandular cilia). .... 8.
8. Tubercles of upper leaf surface large, 1–2/mm.^{2}; calyx lobes broadly ovate, the recurved apices tuberculate or stout-strigulose within; apical lobes of ovary 0.5–1 mm. .... 35. *B. fictum.*
8. Tubercles of upper leaf surface smaller, 7–8/mm.^{2}; calyx lobes oblong, not recurved, glabrous within; apical lobes of ovary 0.1 mm. .... 34. *B. ecuadorense.*
9. Hypanthial and lower leaf surface trichomes smooth. .... 13.
9. Hypanthial and lower leaf surface trichomes roughened. .... 10.
10. Trichomes notably plumulose, on lower leaf surface graded in size with the very numerous smaller ones almost stellate; petals yellowish; connective usually not prolonged ventrally nor free of anther base. .... 14. *B. ledifolium.*
10. Trichomes minutely roughened, on lower leaf surface never pseudo-stellate; petals deep purple; connective always prolonged ventrally and free of anther base more than 0.3 mm. .... 11.
11. Calyx lobes with apical ⅔ to ¾ narrowly lanceolate, basally somewhat expanded, with broadly acute to obtuse sinuses; petal cilia non-glandular or the glands very early caducous. .... 22. *B. huancavelicae.*
11. Calyx lobes oblong-lanceolate to oblong-ovate, basally not expanded, with narrow sinuses; petal cilia obviously and persistently gland-tipped. .... 12.
12. Leaf blades 10–30 × 6–14 mm.; calyx lobes acute, sparsely strigulose on apical ⅕ to ½ within. .... 25. *B. tyrianthinum.*
12. Leaf blades 5–17 × 4–7 mm.; calyx lobes rounded to broadly acute, glabrous within. .... 24. *B. naudinii.*
13. Leaf blades above sparsely to densely pubescent; calyx lobes pubescent at least along midrib for greater part of length without. .... 15.
13. Leaf blades above glabrous; calyx lobes glabrous except for a very few hairs at extreme base without. .... 14.
14. Flowers 5-merous; hypanthium beset with stout patent setae. ..... 33. *B. trichocalyx.*
14. Flowers 4-merous; hypanthium glabrous or very sparsely strigulose. ... 23. *B. nutans.*
15. Leaf blades below sparsely to moderately strigulose or glabrous, the hairs to 7/mm.^{2}; calyx lobes glabrous within. .... 17.
15. Leaf blades below very densely rufolanulose, the hairs 30–40/mm.^{2}; calyx lobes moderately strigulose on apical ⅓ to ¾ within. .... 16.

16. Leaf blades 10–16 × 7–10 mm.; petals yellowish; ovary pubescence non-glandular. .... 7. *B. parvifolium.*
16. Leaf blades 16–38 × 11–19 mm.; petals deep purple; ovary pubescence gland-tipped. .... 8. *B. barbeyanum.*
17. Hypanthium densely stout-strigose; calyx lobes broadly ovate and imbricate. .... 29. *B. strigosum.*
17. Hypanthium sparsely to moderately slender-strigulose or slender-strigose; calyx lobes not imbricate. .... 18.
18. Pedicellar bracteoles 1-nerved, very early caducous; petals carmine to white with rose margins; connective not at all prolonged ventrally at anther base. 16. *B. gracilescens.*
18. Pedicellar bracteoles 3-nerved, persistent at least until anthesis; petals deep purple; connective prolonged ventrally and free of anther more than 0.3 mm. .... 19.
19. Leaf blades 15–30 × 6–10 mm., above sparsely to moderately short-strigose; calyx lobes narrowly acute, widened at extreme base. .... 22. *B. huancavelicae.*
19. Leaf blades 5–17 × 4–7 mm., above sparsely strigulose; calyx lobes rounded to broadly acute, not expanded basally. .... 24. *B. naudinii.*
20. Hypanthium not invested by pedicellar bracts or bracteoles. .... 26.
20. Hypanthium closely invested by two or more large bracts which are persistent at least until anthesis. .... 21.
21. Leaf blades usually wider than 6 mm., with 5 or more primary veins. .... 23.
21. Leaf blades 6 mm. or less wide, with 3 primary veins. .... 22.
22. Upper leaf surface densely covered with tubercles in 6 lines; floral bracts tuberculate apically within; flowers 5-merous; anther pore about ½ or more as wide as anther base. .... 36. *B. multituberculatum.*
22. Upper leaf surface sparsely fine-strigulose; floral bracts glabrous within; flowers 4-merous; anther pore less than ½ as wide as anther base. .... 30. *B. jamesonii.*
23. Leaf blades 30–75 × 10–30 mm.; petals truncate, greenish-white; connective ventrally scarcely prolonged and free of anther only 0.1–0.3 mm. ....12. *B. racemosum.*
23. Leaf blades 11–27 × 7–12 mm.; petals acute to rounded, bright red to deep purple; connective ventrally prolonged and free of anther 0.3–0.7 mm. (cf. 1. *B. quinquenerve).* 24.
24. Leaf blades above densely fine-strigose 8–18/mm.^{2}; bracts thin; petals acute to narrowly obtuse. .... 2. *B. campanulare.*
24. Leaf blades above moderately strigose or strigulose 4–7/mm.^{2}; bracts firm; petals obtuse to rounded. .... 25.
25. Length/width ratio of leaf blade 2.1–2.5; floral bracts acute; calyx lobes not imbricate. .... 3. *B. benthamianum.*
25. Length/width ratio of leaf blade 1.2–1.7; floral bracts rounded; calyx lobes imbricate 1–1.5 mm. .... 4. *B. andreanum*
26. Trichomes, at least those of hypanthium and/or lower leaf surface, roughened. .... 39.
26. Trichomes all smooth. .... 27.
27. Flowers predominantly 4-merous. .... 32.
27. Flowers predominantly 5-merous (cf. 40. *B. rosmarinifolium*). .... 28.
28. Upper leaf surface densely beset with tubercles in 4 lines at widest part of blade (petal cilia gland-tipped). .... 38. *B. markgrafii.*
28. Upper leaf surface merely strigose or strigulose to glabrous. .... 29.
29. Calyx lobes imbricate at anthesis; petal cilia glandtipped. .... 29. *B. strigosum.*
29. Calyx lobes not imbricate at anthesis; petal cilia non-glandular. .... 30.
30. Calyx lobes deltoid to oblong-ovate; anther pore more than ½ as wide as anther base. .... 37. *B. lymphatum.*
30. Calyx lobes lanceolate; anther pore less than ½ as wide as anther base. .... 31.
31. Nodal setae of branchlets inconspicuous; dichasial peduncle drooping, slender; pedicellar bracteoles caducous before anthesis. .... 27. *B. lindenii.*
31. Nodal setae of branchlets markedly developed, to 5 mm. long; dichasial peduncle erect, not differentiated; pedicellar bracts or bracteoles persistent at least until anthesis. .... 26. *B. cernuum.*
32. Leaf blades with 3 primary veins. .... 36.
32. Leaf blades with 5 or more primary veins. .... 33.
33. Dichasia usually paniculate or corymbiform; hypanthium glabrous to moderately short-strigose (calyx lobes glabrous within). .... 35.
33. Dichasia solitary; hypanthium densely fine-strigose. .... 34.
34. Leaf blades suborbicular, with 7 primary veins; calyx lobes ovate, slightly imbricate, glabrous within. .... 6. *B. rotundifolium.*
34. Leaf blades elliptic to ovate-elliptic, with 5 primary veins; calyx lobes narrowly oblong, usually sparsely strigulose on apical ¼ to ¾ within. .... 2. *B. campanulare.*

35\. Calyx lobes lanceolate, longer than wide; petals rhombic-obovate, acute, with gland-tipped cilia. .... 1. *B. quinquenerve.*

35\. Calyx lobes broadly triangular and often apiculate, wider than long; petals broadly obtuse, the cilia non-glandular or the glands early caducous. ... 20. *B. sanguinolentum.*

36\. Connective at anther base prolonged ventrally and free of anther at least 0.3 mm. . 38.

36\. Connective at anther base not at all prolonged ventrally. .... 37.

37\. Leaf blades 20–60 × 10–25 mm.; lateral flowers of dichasium with pedicellar (although early-caducous) bracteoles. .... 16. *B. gracilescens.*

37\. Leaf blades 10–15 × 5–8 mm.; all flowers with ebracteolate pedicels. .... 17. *B. fraternum.*

38\. Dichasia corymbiform; calyx lobes wider than long, broadly triangular. .... 20. *B. sanguinolentum.*

38\. Dichasia solitary; calyx lobes longer than wide. .... 39.

39\. Dichasial peduncle erect; bracteoles inserted below middle of pedicel; petals broadly acute to obtuse. .... 21. *B. grisebachii.*

39\. Dichasial peduncle drooping; bracteoles inserted above middle of pedicel; petals broadly obtuse to rounded. .... 28. *B. alpinum.*

40\. Flowers predominantly 5-merous. .... 45.

40\. Flowers predominantly 4-merous. .... 41.

41\. Leaf blades with 3 primary veins (cf. 40. *B. rosmarinifolium*). .... 43.

41\. Leaf blades with 5 or more primary veins. .... 42.

42\. Dichasia solitary in leaf axils; petals obtuse, with eglandular cilia; connective barely prolonged ventrally, free of anther only 0.1–0.2 mm. .... 18. *B. rugosum.*

42\. Dichasia paniculate; petals acute, with gland-tipped cilia; connective definitely prolonged ventrally, free of anther 0.3–0.6 mm. .... 1. *B. quinquenerve.*

43\. Connective prolonged ventrally, free of anther 0.5–0.7 mm.; petals deep purple. .... 11. *B. maximowiczii.*

43\. Connective not at all prolonged ventrally; petals greenish-white or edged with red. 44.

44\. Trichomes markedly plumulose, non-glandular except for petal cilia; petioles 8–10 mm. long; calyx lobes triangular, about as wide as long. .... 15. *B. weberbaueri.*

44\. Trichomes minutely roughened, at least those of hypanthium, lower leaf surface, and ovary gland-tipped; petioles 2–5 mm. long; calyx lobes oblong-ovate, longer than wide. .... 43. *B. lutescens.*

45\. Upper leaf surface densely beset with tubercles in 4 rows at widest part of blade; anther pore ½ or more as wide as anther base. .... 39. *B. lycopodioides.*

45\. Upper leaf surface variously pubescent but if tuberculate, the tubercles in 6 or more rows; anther pore less than ½ as wide as anther base. .... 46.

46\. Connective prolonged ventrally and free of anther 0.3 mm. or more; petals deep purple, except *B. figueroae.* .... 51.

46\. Connective barely or not at all prolonged ventrally, free of anther less than 0.2 mm.; petals yellowish to whitish, at least marginally, except (?) occasionally in *B. rostratum.* .... 47.

47\. Hypanthium glandular-hirsute, or sparsely to moderately strigulose and then glandular or not; ovary pubescence and petal cilia gland-tipped; apical lobes of ovary 0.1–0.4 mm. .... 49.

47\. Hypanthium very densely strigulose to hirsute, the trichomes never gland-tipped; ovary pubescence and petal cilia non-glandular; apical lobes of ovary 0.5–2 mm. ...... 48.

48\. Trichomes shaggy-plumulose, those on lower leaf surface very dense (30–60/mm.^{2}) and graded in size with the numerous smaller ones almost stellate; leaf blades mostly 15–25 × 7–12 mm.; ovary sparsely strigulose on apical ¼ to ⅓. .... 14. *B. ledifolium.*

48\. Trichomes minutely roughened, those on lower leaf surface only 5–15/mm.^{2} and not markedly graded in size, never pseudo-stellate; leaf blades mostly 30–75 × 10–35 mm.; ovary densely strigulose on apical ½. .... 13. *B. gleasonii.*

49\. Bracts at base of dichasium persistent at least until anthesis. .... 42. *B. rostratum.*

49\. Bracts at base of dichasium very early caducous. .... 50.

50\. Leaf blades elliptic, 12–21 × 4–8 mm., the tubercles on the upper surface in more than 10 irregular rows at widest part; hypanthium glandular-hirsute. ...... 45. *B. seorsum.*

50\. Leaf blades narrowly oblong, 7–17 × 1.5–3.5 mm., the tubercles on the upper surface in only 6 rows at widest part; hypanthium moderately strigulose, the trichomes non-glandular. .... 44. *B. angustifolium.*

51\. Calyx lobes triangular-acuminate to almost triangular, usually wider than long, the sinuses obtuse to very broadly acute. .... 19. *B. microdon.*

51\. Calyx lobes ovate to oblong, longer than wide, the sinuses narrowly acute. ...... 52.

52. Leaf blades with 5 primary veins. .... 9. *B. intermedium.*
52. Leaf blades with 3 primary veins. .... 53.
53. Leaf blades 11-50 × 6-24 mm.; ovary pubescence non-glandular; apical lobes of ovary 0.6-1.5 mm. .... 55.
53. Leaf blades 6-12 × 3-7 mm.; ovary pubescence gland-tipped; apical lobes of ovary 0.2-0.3 mm. .... 54.
54. Petals whitish, obliquely truncate; connective ventrally free of anther 0.3-0.5 mm., the ventral lobes each 0.2-0.3 mm. wide. .... 41. *B. figueroae.*
54. Petals deep purple, obtuse; connective ventrally free of anther 0.8-1.4 mm., the ventral lobes each 0.6-0.7 mm. wide. .... 40. *B. rosmarinifolium.*
55. Petals moderately strigulose without. .... 10. *B. radula.*
55. Petals glabrous without. .... 11. *B. maximowiczii.*

1. Brachyotum quinquenerve (R. & P.) Triana, Trans. Linn. Soc. 28: 48. 1871.

Trichomes moderately but minutely roughened to smooth. Branchlets rounded-quadrangular, moderately strigulose to short-strigose. Petiole (4-)10-20 or 2-6 (-9) mm. Blade 23-80 or 10-20(-35) × 12-40 or 6-12(-20) mm., ovate or lanceolate to elliptic, the apex acute, and the base obtuse to truncate, with 5 or sometimes 7 primaries and usually an additional pair of marginals, the primaries narrowly impressed above and elevated below, the secondaries mostly obscure above and elevated and laxly reticulate below; the 3 central primaries more or less prolonged below the base of the blade and forming a small triangular extension of the blade proper, the second laterals departing from and 2-7 mm. above the base of the first laterals, the third laterals (when present) also departing from and 1-5 mm. above the base of the first laterals, the fourth laterals (marginals, when present) also from and 1-3 mm. above the base of the first laterals; above moderately strigose or strigulose, the hairs 3-5(-10)/mm.^{2} with the basal ⅓-½ adherent and usually not greatly nor abruptly expanded; below moderately strigulose to loose-short-strigose, the hairs (7-)10-12(-20)/mm.^{2}, the glands solitary and usually 10-15/mm.^{2} Flowers constantly 4-merous, in 3-many-flowered panicles which are terminal on lateral branches or in upper leaf axils, the inflorescence branches subtended by a gradually smaller series of bracts, the ultimate pedicels grouped in 2-3-flowered dichasia. Pedicel 0-3 mm. below pedicellar bracteoles, 1-6 mm. above; pedicellar bracteoles 3.5-8 × 0.2-1.7 mm., linear, above glabrous, below moderately strigulose, mostly caducous just before anthesis, in crowded inflorescences sometimes absent. Hypanthium (3-)4-5(-6) × (2.5-)3.5-4.5 mm., 0.2-0.3 mm. thick medianly, moderately long-strigulose to short-strigose, the hairs (7-) 10-13(-18)/mm.^{2} Sepals 5-10 × 3-4 mm., lanceolate and contracted about 0.5-1 mm. above the sinuses to 1-2 mm. wide, the apices narrowly acute, united at bases 0.9-1.2 mm., usually with 1-few sinusal setae well-developed. Petals deep purple or deep blue, (10-)12-14(-15) × (7-)8-10(-11) mm., rhombic-obovate and slightly asymmetrical, the apices acute, the gland-tipped cilia 0.1-0.4 mm. (the terminal few 0.5-2 mm.). Filaments 3-5.5 mm.; anthers 3-5.5 mm.; connective at anther base 0.7-1.1 mm., free of the anther 0.3-0.6 mm., the ventral lobing 0.1-0.4 mm., and often with minute apiculi on each lobe. Style 18-26 × 0.3-0.5 mm., exserted 6-14 mm. Ovary 3-6 × 2-3.5 mm., moderately to densely strigulose on the apical 1-2.5(-3.5) mm., the apical lobes 0.5-0.8(-1.2) mm. above the locules.

1a. Brachyotum quinquenerve var. quinquenerve.

Rhexia quinquenervis R. & P. Fl. Per. & Chil. 3: 83. 1802.
Arthrostemma quinquenerve (R. & P.) DC. Prodr. 3: 136. 1828.
Chaetogastra quinquenervis (R. & P.) Naudin, Ann. Sci. Nat. III. 14: 130. 1850.

Hypanthial and stem hairs usually obviously roughened, at least on basal portion. Petiole (4-)10-20 mm. Blade 23-80 × 12-40 mm., with vegetative leaves on branches mostly longer than 40 mm.

Type Collection and Locality: *Ruiz and/or Pavón s.n.* (presumably at MA; probable isosyntypes without locality BR, G-BOIS, G-DEL, P); "Huassahuassi, Panao, Chaclla, et Muña montibus, copiose in Sancti Dominici et Llamapañaui collibus." The first of these localities is in Dept. Junín, Peru, the others in Dept. Huánuco (Ruiz 1940).

Type Photographs and Illustrations: F16716 and Gleason 27-2 (destroyed syntype at B); Ruiz & Pavón, Fl. Per. & Chil. **3**: *pl. 321, f. b* (1802) (as *Rhexia quinquenervis*); Trans. Linn. Soc. **28**: *pl. 3, f. 33c* (1871) (as *Brachyotum quinquenerve*).

Distribution: central to south central Peru, alt. 1500–3200 m.

Huánuco: Chinchao, *McLean s.n.* (K), *Rivero 95* (P), *herb. Ruiz & Pavón s.n.* (F); Carpish divide between Huánuco and Tingo Maria, *Asplund 12861* (S), *Ferreyra 1231* (USM), *Ferreyra 1713* (USM), *Ferreyra 1732* (USM), *Ferreyra 2113* (NY, US), *Ferreyra 8078* (USM), *Sandeman 5169* (K); Acomayo, *Ferreyra 8182* (USM); Panao, *Asplund 13512* (S), *Ferreyra 1795* (USM), *Pearce s.n.* (K); Tambillo southwest of Panao, *Scolnik 1052* (NY), *Macbride 3572* (F, G-DEL, NY, S, US); Playapampa, *Macbride 4858* (F, S, US); Yanano, *Macbride 4940* (F, NY). Junín: Carpapata near Huacapistana, *Ferreyra 3759* (NY), *Killip & Smith 24448* (NY, US); near Huacapistana, *Ferreyra 3607* (NY), *Killip & Smith 24131* (F, NY, US), *Sandeman 97* (K), *Sandeman 4368* (K); between Punto and Andamarca, *Raimondi 8784* (USM); near "Andimarca," *Mathews 1170* (K, NY, W). Cuzco: Machupicchu, *Balls B6813* (GH, NY, UC, US), *Herrera 3208* (F, NY), *Herrera 3224* (F), *Sandeman 3586* (K), *Vargas 801* (F, NY), *West 6422* (GH, UC); San Miguel in the Urubamba Valley, *Cook & Gilbert 1171* (US); Cedrobamba in the Urubamba Valley, *Herrera 1559* (F, NY, US); Huayna Picchu, *Scolnik 836* (NY); Punto Real in the Urubamba Valley, *Tutin 1318* (BM); Urubamba basin, *Herrera 1964* (F, NY); between Lares and Calca, *Raimondi 9578* (USM). Ayacucho: Ccarrapa between Huanta and Río Apurimac, *Killip & Smith 22272* (F, NY, US), *Killip & Smith 22333* (NY, US).

Vernacular Names: Cachiquis (Ruiz & Pavón, Fl. Per. & Chil. **3**: 1802); Hüaychuy *(Ferreyra 1795)*; Masuca *(Cook & Gilbert 1171)*.

1b. Brachyotum quinquenerve var. pusillum Wurdack, var. nov.

Hypanthiorum ramulorumque trichomata laevia vel minutissime muriculata (sub lente 90×). Petioli 2–6(–9) mm. longi. Foliorum ramorum principium laminae 10–20 (raro ad 35) × 6–12 (raro ad 20) mm.

Type Collection and Locality: *Pennell 15772* (HOLOTYPE PH); Peru, Dept. Amazonas, along Río Sonche, west of Molinopampa, dry sandy barren, 2400 m. alt., 8 Jul. 1948. "Shrub. Petals anthracene violet."

Distribution: northern Peru, alt. 2400–3200 m.

Piura: Tadene between Provinces of Huancabamba and Jaen, *Raimondi 2312* (USM). Cajamarca: northwest of Socota, *Stork & Horton 10141* (F, G-DEL, UC); Cutervo, *Raimondi 3841* (USM), *Raimondi 4711* (USM); Llama, *Sandeman 4163* (K). Amazonas: Yambrasbamba, *Mathews 1257* (K); Chachapoyas, *L. Williams 7572* (F, NY, US), *Mathews 1258* (BM, K).

B. quinquenerve is closely related on one hand to the complex including *B. huancavelicae* and *B. grisebachii*, on the other to *B. campanulare*. Its 5–7-nerved leaves and usually well-developed paniculate inflorescences serve as distinctions from the small-leaved Peruvian relatives. The McLean Chinchao specimen cited here was placed by Triana and Cogniaux under *B. campanulare*, but has the inflorescence and sepals of *B. quinquenerve*, although nearly smooth trichomes; the label on this specimen states "Ex Herb. de R. and P. Lima" and the sprig is matched exactly by a lanceolate-leaved sprig on the herb. Ruiz & Pavón Chinchao sheet (F) and the Rivero collection (P), so probably this collection has been miscredited to McLean.

The small foliage of var. *pusillum* gives it quite a different appearance from var. *quinquenerve*; the inflorescences are also less well-developed than in the typical variety. Unfortunately, no collections from areas between Cajamarca and Huánuco have been seen, so the geographical disjunction, if any, and the variation between the varieties could not be established. The specimens of the typical variety which have nearly smooth trichomes are otherwise well-marked by the large leaves; the roughening of the hairs is most marked in the Cuzco collections. Several sheets from Cuzco have gland-tipped trichomes on the hypanthium, sepals, bracteoles, and pedicals: *West 6422 p.p.* (GH p.p.), *Herrera 3208 p.p.* (NY p.p., F), and *Cook & Gilbert 1171* (US). This has not been deemed worthy of any formal recognition because of variation within a single collection and similar glandulosity fluctuation in other species.

In addition to the specimens cited for *B. quinquenerve*, *Raimondi 7238* (USM) from Tambillo in Dept. Ayacucho should be considered. This collection has minutely roughened hairs; elliptic, 3-nerved leaf blades, 12–21 × 5–7 mm.; and flowers similar to *B. quinquenerve*. It may represent a distinct species or a variety of *B. quinquenerve*. In habit, it is very suggestive of var. *pusillum*, except for the 3-nerved leaf blades and roughened hairs. The densely strigulose lower leaf surfaces, ternate flowers, and glandular-ciliate acute petals separate it from *B. huancavelicae*; the much denser and roughened pubescence and glandular-ciliate petals, from *B. grisebachii*.

2. **Brachyotum campanulare** (Bonpl.) Triana, Trans. Linn. Soc. 28: 48. 1871.

Rhexia campanularis Bonpl.Rhexies 35. 1806–1808.
Arthrostemma campanulare (Bonpl.) DC. Prodr. 3: 136. 1828.
Chaetogastra campanularis (Bonpl.) Naudin, Ann. Sci. Nat. III. 14: 130. 1850.

Trichomes smooth. Branchlets rounded-quadrangular, densely fine-strigose to fine hirsute. Petiole 3–7 mm. Blade 13–27 × 11–14 mm., elliptic to elliptic-ovate with the apex broadly acute to obtuse and the base obtuse, the 5 primaries impressed above and elevated below, the 10–20 pairs of secondaries obscurely visible above but hidden by the pubescence below; above densely strigose, the hairs 8–18/mm.^{2} with their bases sometimes on very low callosities; below very densely loose-sericeous-strigose 20–35/mm.^{2} Flowers constantly 4-merous, mostly crowded-ternate with the dichasium subtended by leaves, rarely solitary or with an additional pair of flowers at the node below the dichasial node. Pedicel 0.5–2 mm. below the bracteoles, 1–5 mm. above; pedicellar bracteoles 3–9 × 0.6–0.9(–4) mm., linear to ovate, thin, above glabrous, below densely strigulose, mostly caducous before anthesis. Hypanthium 6–7.5 × 3.5–4.5 mm., 0.2–0.3 mm. thick medianly, densely loose-strigose, the fine hairs 15–20/mm.^{2} Sepals 7–9 × 3–3.5 mm., narrowly oblong, often slightly narrowed from middle to base and tapering to the acute apices only in the terminal 2–4 mm., united at bases about 1 mm., the sinuses rounded-acute, inside usually sparsely strigulose on the apical ¼–¾. Petals deep purple, 12–18 × 9–11 mm., obovate or slightly obovate and symmetrical, the apices narrowly obtuse to broadly acute, the gland-tipped cilia 0.1–0.6 mm. (the terminal one 0.8 mm.). Filaments 4–5.5 mm., anthers 5–5.5 mm.; connective at anther base 1–1.2 mm., free of the anther 0.5–0.6 mm., the ventral lobing 0.1–0.2 mm. Style 17–25 × 0.5 mm., exserted 5–7 mm. Ovary 5 × 2.5–3 mm., densely strigulose on the apical 2.5 mm., the apical lobes 1 mm. above the locules.

Type Collection and Locality: *Bonpland s.n.*(HOLOTYPE presumably in Herb. *Humboldt & Bonpland* at P; isotypes F, P); "in Peruviae frigidis, juxta Loxam . . . près de 2000 mètres."

Type Photographs and Illustrations: F36135 (presumed holotype or isotype); Rhexies *pl. 14* (1806–1808) (as *Rhexia campanularis*).

Distribution: Prov. Loja, Ecuador, alt. 2000–3100 m.

Between San Lucas and Oña, *Hitchcock 21550* (GH, NY, US); Cordillera de Zamora east of Loja, *Camp E-71* (NY); Loja, *Seemann 773.1* (K). Without province, *Jameson s.n.* (US, W).

The Paris isotype of *B. campanulare* cited here was used by Naudin in his description of the vegetative features and type of inflorescence of *Chaetogastra canescens*. His dissection sketch and the dissected flowers in the packet on the same sheet are *Rhexia canescens (Brachyotum ledifolium)*. These detached flowers led to Naudin's mixed description; the leaves of *B. ledifolium* are never "5 nerviis," and the flowers are usually solitary rather than "solitariis-ternis interdumque pluribus."

B. campanulare is closely related to *B. quinquenerve*, but may be distinguished by the shape of the often adaxially pubescent sepals, generally denser pubescence, and fewer-flowered inflorescences. *B. benthamianum* is doubtfully distinct from *B. campanulare*; only the sparser and coarser foliage pubescence, less acute petal apices, and thicker and somewhat larger bracts differentiate the former. The main veins of the bracteoles of *B. campanulare* vary from 1 to 5 in number, the shape from linear to ovate, and the tenacity from caducous in bud to persistent until the corolla drops.

Another Jameson specimen s.n. (K), from (or sent from ?) Quito, is closely related to *B. campanulare*. The thin, 3-nerved, pedicellar bracteoles are ovate, 3-4.5 × 1.5-2.5 mm., and caducous in bud; however the leaves are much less pubescent above (4-6/mm.^{2}) and the calyx lobes triangular (4.8-5 × 3.7-4 mm.).

3. Brachyotum benthamianum Triana, Trans. Linn. Soc. 28: 49. 1871.

Trichomes smooth. Branchlets rounded-quadrangular, densely to moderately short-strigose. Petiole 4-6 mm. Blade 15-24 × 7-10 mm., with length/width ratio 2.1-2.5, elliptic to ovate-elliptic with the apex acute and the base broadly acute to narrowly obtuse, the 5 primaries impressed above and elevated below, the 15-20 pairs of secondaries mostly hidden by the pubescence; above moderately long-strigulose, the hairs 4-7/mm.^{2}, each on a low callosity with basal $\frac{1}{3}$-$\frac{2}{3}$ adherent and the slightly branched base about 0.3 mm. diam.; below densely loose-strigulose 25-30/mm.^{2}, the glands solitary and obscured by the pubescence. Flowers 4- or 5-merous, mostly ternate with the dichasium subtended by leaves, occasionally with an additional pair of flowers at the node below the dichasial node. Pedicel 2-5 mm. below bracts, 1-2 mm. above. Bracts closely investing flower 2 or 4, 10-15 × 2-8 mm., lanceolate to ovate or elliptic with the apices acute, persistent, firm, 5-nerved, outside densely strigose 9-12/mm.^{2}, inside glabrous or marginally sparsely strigulose. Hypanthium 6.5-7 × 4-6 mm., 0.5 mm. thick medianly, densely sericeo-strigose, the hairs 8-15/mm.^{2} and to 2.5-3 mm. long. Sepals 6.5-9.5 × 3.5-4.5 mm., oblong with acute apices, united at bases 0.8-1 mm., the sinuses rounded-acute. Petals "violacea," 14-18 × 11-13 mm., obovate and slightly asymmetrical with the apices obtuse to rounded, the mostly gland-tipped cilia 0.1-0.8 mm. (the terminal one 0.9-1.3 mm.). Filaments 4.5-5 mm.; anthers 5.5-6 mm.; connective at anther base 1-1.3 mm., free of the anther 0.6-0.7 mm., the ventral lobing 0.2-0.3 mm. Style 20-27 × 0.5-0.6 mm., exserted 8-10 mm. Ovary 5.5 × 3.5 mm., moderately strigulose on the apical 2.5-3.5 mm., the apical lobes 0.5-1.5 mm. above the locules.

Type Collection and Locality: *Hartweg 737* (LECTOTYPE K; isolectotypes BR, G-BOIS, G-DEL, K, P, W; fragment of isolectotype F), and *Seemann 773 bis* (syntype K); "in montibus Peruviae" (Loja, fide K sheet containing both syntypes).

Type Photographs and Illustrations: Gleason 87-2 (isolectotype at K); F16708 (destroyed isolectotype at B); Baill. Hist. des Pl. 7: 8, *f. 11* (1880).

Distribution: Prov. Loja, Ecuador, elev. 2500-3000 m.

Above Loja, *Lehmann 4922* (K); without province, *Jameson s.n.* (BR, US, W).

The Kew isolectotype has mostly lanceolate bracts, 10–15 × 2–3.5 mm., usually 2 per flower but sometimes 4. The lectotype, Geneva isolectotypes, and the Seemann collection have wider ovate to oblong-ovate bracts, 11–16 × 6.5–8 mm., mostly 2 per flower. The Paris isolectotype and the Jameson specimens have bracts similar in size to the lectotype, but mostly 4 per flower. Of 14 flowers examined in the Hartweg collection, 7 were 4-merous, the remainder 5-merous; in the Jameson collection 4 of 7 were 4-merous, the others 5-merous; in the Seemann collection 4 of 6 were 4-merous, the others 5-merous. The Jameson sheets are numbers 8 and 9 of the set marked by Asa Gray, but seem to be all parts of one collection. Through a misinterpretation, the Kew isolectotype was at first assumed to be the lectotype, and photographs of this mislabeled sheet were distributed from New York. *B. benthamianum* is very closely related to *B. andreanum*, but is distinguishable from the latter, on the basis of present collections, by the relatively narrower leaves, the acute-tipped inner floral bracts, and the oblong, non-imbricate sepals.

4. **Brachyotum andreanum** Cogniaux, Bull. Acad. Sci. Brux. III. 14: 938. 1887.

Trichomes smooth. Branchlets obscurely quadrangular, densely loose-strigose. Petiole 3–5 mm. Blade 11–16 × 7–12 mm., with length/width ratio 1.2–1.7, broadly elliptic to broadly ovate with the apex broadly acute to broadly obtuse and the base obtuse to sub-truncate, the 5 primaries and 10–12 pairs of secondaries as in *B. benthamianum*; above densely long-strigulose to short-strigose 4–6/mm.^{2}, the hairs as in *B. benthamianum*; below pubescent as in *B. benthamianum*. Flowers 5-merous, ternate or solitary (when ternate occasionally with an additional pair of flowers at the node below the dichasial node), with each flower closely invested by 4 persistent bracts. Pedicel 1–2 mm. below bracts, 0.5–1 mm. above; bracts 8–12 × 6–8.5 mm., broadly elliptic with the apices rounded, 7–9-nerved, firm, outside densely strigose 11–12/mm.^{2}, inside glabrous or sparsely hirsutulous basally. Hypanthium 6–7 × 6–6.5 mm., 0.3 mm. thick medianly, very densely sericeo-strigose, the hairs to 3–6 mm. long. Sepals 6–8.5 × 5.5–6 mm., broadly ovate with the apices broadly acute to obtuse, united at bases 0.3–0.6 mm., imbricate 1–1.5 mm. on each side. Petals "vivide sanguinea" (fide holotype), 15 × 10–11 mm., obovate and slightly asymmetrical with the apices rounded, the gland-tipped cilia 0.1–0.3 mm. (the apical few 1.3–2.3 mm.). Filaments 5.5 mm.; anthers 4–5 mm.; connective at anther base 0.8–1.2 mm., free of anther 0.3–0.5 mm., the ventral lobing 0.2 mm. Style 22 × 0.35 mm., exserted 4 mm. Ovary 6 × 4–4.5 mm., very densely short-strigose on the apical 3–3.5 mm., the apical lobes 0.8–1.5 mm. above the locules.

Type Collection and Locality: *André s.n.* (HOLOTYPE K; isotype BR); "in Andibus centralibus Ecuadorensibus, altit. 3300 m."

Type Photograph: Gleason 87-4 (holotype).

Distribution: Definitely known only from Prov. El Oro-Loja border in Ecuador, alt. 2950 m.

Chepel northeast of Zaruma, *Espinosa 2003* (NY). Without province, *Jameson s.n.* (US). "Amér. Mérid.," *Bonpland s.n.* (P).

All of the 12 examinable flowers among the various specimens seen were 5-merous. This species is very closely related to *B. benthamianum* and has leaves quite similar to *B. campii*.

5. **Brachyotum campii** Wurdack, sp. nov.

Trichomata laevia. Ramuli novelli obscure quadrangulati cum petiolis pedicellisque dense brunneo-strigosi. Petiolus 2–5 mm. Lamina 9–13 × 6–9 mm., late elliptica apice basique late obtusa vel rotundata, nervis primariis 5 supra impres-

sis subtus expressis sed cum nervis secundariis plerumque ab pilis occultis; supra dense strigosa, pilis 4–5/mm.^{2}, basi 0.5–0.6 mm. diam. et 0.5–0.8 mm. alta radicina, apice abrupte attenuato 0.5–0.6 mm. longo; subtus densissime laxeque sericeo-strigulosa. Flores 5-meri in ramulis brevibus solitarii bracteis 4 conjuncte investi, pedicello super bracteas 1–2 mm. Bracteae 9–11 × 8–9 mm., orbiculares vel ovato-orbiculares, apice subretusae, nervis principalibus 9–11, intus glabrae, extus dense strigulosae 18–20/mm.^{2}, duabus exterioribus valde caducis interioribus persistentibus. Hypanthium 8 × 9 mm., medio 0.5 mm. crassum, densissime sericeo-strigosum pilis 12–15/mm.^{2} et ad 2–2.5 mm. longis. Sepala 5.5–6.5 × 5–6 mm., late ovata, vix imbricata, apice late acuta et apiculata, basi per 0.6–0.8 mm. cohaerentia. Petala 16–17 × 16–17 mm., obovata vix asymmetrica, apice truncata, ciliis glandulosis 0.1–0.4 mm. Filamenta 6.5 mm.; antherae 5.5–6 mm.; connectivum basi antherae 1–1.5 mm., ab anthera per 0.3–0.5 mm. liberum, lobis ventralibus 0.4–0.7 mm. Stylus 18 × 1 mm., non vel vix (1 mm.) exsertus, parte tertia proxima dense brevi-strigosa et expansa 2 mm. diam. Ovarium 3.5 × 4.5 mm., apice per 2.5 mm. dense brevi-strigosa, lobis apicalibus super loculos 0.2 mm.

Type Collection and Locality: *Camp E-1629* (HOLOTYPE NY); Ecuador, Azuay-Oriente border, Páramo del Castillo and surrounding forested areas, crest of the eastern Cordillera on the trail between Sevilla de Oro and Mendez, 11000–11350 ft. alt., 17 Dec. 1944. "Shrubs 1–2 m. Pubescence on stems brown. Lvs deep green above, very pale yellowish below. Bracts red, or red tipped with green; green part (when present) with texture of leaf; red part smooth and shining. Corolla never fully open, tubiform, black with purplish tinge." Known only from the type collection.

B. campii is at once distinguished from all other known species of the genus by the style, with the enlarged basal ⅓ densely clothed with slender arcuate hairs 0.5–1.5 mm. long. Several other species occasionally have a very few erect setae on the style, but never as a characteristic feature. In this respect, *B. campii* parallels the pubescent-styled species of *Tibouchina*, which have been scattered through the first three sections of that genus by Cogniaux, and some of which also have bract-invested flowers. The non-exserted style of *B. campii* is also unique. Apart from the style, this species is closely related to *B. andreanum*, but may further be distinguished from that species by the non-imbricate sepals and orbicular flower bracts.

6. **Brachyotum rotundifolium** Cogniaux, Bull. Acad. Sci. Brux. III. 14: 937. 1887.

Trichomes smooth. Branchlets obscurely quadrangular, very densely-rufo-hirsutulous. Petiole 6–7 mm. Blade 12–23 × 12–20 mm., orbicular to ovate-orbicular with the apex rounded and the base truncate, the 7 primaries and 11–14 pairs of secondaries impressed above and elevated below but hidden by the pubescence; above densely short-strigose, the hairs 6–10/mm.^{2}, each about 0.2 mm. diam. and the basal ⅓–½ adherent but the apical free portion not abruptly contracted; below very densely rufo-hirsutulous 25–45/mm.^{2} Flowers 4-merous, crowded-ternate with the dichasium subtended by somewhat reduced leaves, occasionally with an additional pair of flowers at the node below the dichasial node. Pedicel 3 mm. below bracteoles, 4 mm. above; pedicellar bracteoles 11 × 2.5 mm., slightly spatulate with acute apices, 3-nerved, caducous before anthesis, above sparsely puberulent at extreme apex, below densely rufo-hirsutulous on entire surface. Hypanthium 5.5 × 5 mm., 0.3 mm. thick medianly, densely loose-rufo-strigose 11–12/mm.^{2} Sepals 6.5–7 × 4.5 mm., ovate and very slightly imbricate with acute apices, united at bases 0.8 mm. Petals "purpureo-violacea," 13–13.5 × 9.5–10.5 mm., slightly and asymmetrically obovate with narrowly obtuse apices, the cilia 0.1–0.3 mm. and eglandular except for a few basal ones. Filaments 5 mm.; anthers

4.7–5.2 mm.; connective at anther base 0.9–1 mm., free of the anther 0.3–0.4 mm., the ventral lobing 0.4–0.5 mm. Style 20 × 0.6 mm., exserted 3–4 mm. Ovary 5.2 × 3 mm., densely long-strigulose on the apical 3 mm., the apical lobes 0.7–0.9 mm. above the locules.

Type Collection and Locality: *André 4501* (HOLOTYPE K; isotypes BR, F, GH, NY, US); "apud 'Paramos' montium in Andibus Ecuadorensibus frequens, altit. 3200–3800 m." Known only from the type collection.

Type Photograph: Gleason 88-7 (isotype at K).

B. rotundifolium is generally related to *B. campanulare*, *B. benthamianum*, and *B. andreanum*, but may be distinguished from all of these by the 7-nerved leaves.

7. Brachyotum parvifolium Cogniaux, Bot. Jahrb. 42: 132. 1908.

Trichomes smooth. Branchlets rounded-quadrangular, very densely and finely rufo-lanulose. Petiole 1–6 mm. Blade 10–16 × 7–10 mm., elliptic with the apex broadly acute to rounded and the base obtuse, the 3 primaries and the secondaries obscured by the pubescence; above very densely and finely loose-strigulose 20–25/mm.^{2}; below very densely rufo-lanulose, the hairs 30–35/mm.^{2} and to 1.5 mm. long. Flowers 5-merous, solitary on short leafy lateral branchlets. Pedicel 3 mm. above the persistent undifferentiated leaves (bracteoles ?). Hypanthium 5–6 × 5.5–6.5 mm., 0.6 mm. thick medianly, very densely and finely rufo-lanulose with hairs to 2.5 mm. long. Sepals 5.5–7.5 × 3.5–4.5 mm., oblong-ovate with the apices broadly acute, united at bases 0.4–0.6 mm., the sinuses acute, inside densely fine-strigulose on the apical ⅓–½. Petals "sulfur-yellow," 13–14 × 10–12 mm., obovate with the apices obliquely truncate or blunt-rounded with a small apiculus, the marginal gland-tipped cilia 0.1–0.3 mm. Filaments 5–5.5 mm.; anthers 4.5–5.5 mm.; connective at anther base 0.8–1 mm., free of the anther 0.2–0.4 mm., the ventral lobing 0.2–0.3 mm. Style 21 × 0.8 mm., exserted 5 mm. Ovary 4–4.5 × 2.5–3.5 mm., densely strigulose with non-glandular hairs on the apical 1.5–2.5 mm., the apical lobes 0.6 mm. above the locules.

Type Collection and Locality: *Weberbauer 4406* (LECTOTYPE BR; isotype G-DEL; fragment of isotype F); "Peru: Tambo Ventillas apud Chachapoyas," 2400–2500 m. elev.

Type Photographs: F16715 and Gleason 28-5 (destroyed holotype at B).

Distribution: Dept. Amazonas, Peru, alt. 2400–2900 m.

Cerro de Fraijaco northeast of Tambo de Ventilla, *Pennell 15841* (PH).

Both *B. parvifolium* and its nearest relative, *B. barbeyanum*, are closely related to *B. campanulare* and *B. rotundifolium*, differing however in the solitary and constantly 5-merous flowers, more obtuse petals, and usually 3-nerved leaves. Cogniaux thought that the petals of *B. parvifolium* were probably purple, but Pennell's notes and the appearance of the petals on his collection indicate a yellowish color.

8. Brachyotum barbeyanum Cogniaux; DC. Monog. Phan. 7: 158. 1891.

Trichomes smooth. Branchlets obscurely quadrangular, very densely rufo-lanulose. Petiole 3–10 mm. Blade 16–38 × 11–19 mm., elliptic to elliptic-ovate with the apex broadly acute to obtuse and the base obtuse, with three primaries and sometimes also 2 faint marginals on the larger leaves, mostly hidden by the pubescence; above very densely loose-strigulose, the fine hairs 12–20/mm.^{2}; below very densely rufo-lanulose, the hairs 35–40/mm.^{2} and to 2 mm. long. Flowers 5-merous, solitary on short leafy lateral branchlets. Pedicel 3–4 mm. above the last persistent undifferentiated leaves (bracteoles ?). Hypanthium 5–7 × 6–6.5 mm., 0.3–0.9 mm. thick medianly, very densely rufo-lanulose with hairs to 3.5 mm. long. Sepals 8–9.5 × 5.5–6 mm., oblong-lanceolate to lanceolate with the apices narrowly to broadly acute, united at bases 0.7-1.1 mm., the sinuses acute, inside moderately strigulose on the apical ⅓-¾. Petals deep purple, 13-16 × 11-13 mm., obovate with the apices very broadly obtuse, the gland-tipped cilia 0.1-0.3 mm. Filaments 6-6.5 mm.; anthers 5.5-6.5 mm.; connective at anther base 0.8-1 mm., free of the anther 0.4-0.5 mm., the ventral lobing 0.2-0.4 mm. Style 26 × 0.9 mm., exserted 5 mm. Ovary 5-7.5 × 3.5-4 mm., densely strigulose with gland-tipped hairs on the apical 2-3.5 mm., the apical lobes 0.7-1 mm. above the locules.

Type Collection and Locality: *Mathews s.n.* (HOLOTYPE G-BOIS; isotypes BR, NY); "in Peruviae ad Chachapoyas."

Type Photograph: F36853 (holotype).

Distribution: Dept. Amazonas, Peru, alt. 2800-2900 m.

Cerro de Fraijaco northeast of Tambo de Ventilla, *Pennell 15842* (PH).

B. barbeyanum is very similar to *B. parvifolium*, but differs in the generally larger proportions, glandular ovary pubescence, and petal color.

9. Brachyotum intermedium Wurdack, sp. nov.

Trichomata minute modiceque aspera. Ramuli novelli quadrangulati cum petiolis pedicellisque densissime rufo-gracili-strigosi. Petiolus 10-15 mm. Lamina 28-42 × 15-23 mm. elliptica apice basique obtusa, nervis primariis 5 supra graciliter impressis subtus expressis sed non vel vix reticulatis; supra modice strigulosa, pilis gracilibus 5-7/mm.^{2} basibus ⅓ adhaerentibus et non expansis; subtus densissime rufo-sericeo-strigulosa 35-40/mm.^{2} Flores 5-meri terni vel duo additicii in nodo sub dichasii nodo. Pedicellus 0-1 mm. sub bracteis, 3-4 mm. super; pedicelli bracteae 8-12 × 3.5-6 mm. ellipticae vel subobovatae persistentes pubescentia foliorum eadem. Hypanthium 5.5 × 5.3 mm., medio 0.3 mm. crassum, densissime rufo-strigosum. Sepala 5.5-6 × 3.5-4 mm. triangulari-ovata apice acuta basi per 0.8-1 mm. cohaerentia, intus parte ¼ apicali sparse strigulosa. Petala purpurea 11.5-12 × 8.5-9 mm. obovata apice obtusa extus apice extremo sparsissime strigulosa aliter glabra, ciliis glandulosis 0.1-0.3 mm. glandulis modice caducis. Filamenta 4-4.5 mm.; antherae 4.5 mm.; connectivum basi antherae 0.9-1 mm., ab anthera per 0.4-0.5 mm. liberum, lobis ventralibus 0.3 mm. Stylus 19-21 × 0.9 mm., per 8 mm. exsertus. Ovarium 5 × 2.5 mm., apice per 2.5 mm. dense strigulosum, lobis apicalibus super loculos 0.5 mm.

Type Collection and Locality: *Mathews 3210* p.p. (HOLOTYPE K); Chachapoyas, Dept. Amazonas, Peru. Known only from the type collection.

Type Photograph: Gleason 88-10 p.p. (holotype).

The holotype of this species is mounted on the same sheet as the holotype of *B. radula*, and Triana's description of that species included *B. intermedium*; however, his description of the upper leaf surface pubescence clearly applies only to *B. radula*. From that species, *B. intermedium* may be distinguished by the obviously 5-nerved leaves with somewhat longer petioles, the upper leaf surface with fine hairs, the non-reticulate secondary veins on the lower leaf surface, the sepals which are pubescent within, and the nearly glabrous petals. The trichomes are much less densely roughened than in *B. radula* or *B. maximowiczii*. These trichomes, the internal sepal pubescence, and general appearance suggest linkage with *B. barbeyanum*.

10. Brachyotum radula Triana, Trans. Linn. Soc. 28: 48. 1871.

Brachyotum asperum Cogniaux, Bot. Jahrb. 42: 132. 1908.

Trichomes notably and densely roughened, as in *B. ledifolium*. Branchlets rounded-quadrangular, densely strigulose. Petiole 4-11 mm. Blade 20-50 × 10-30 mm., elliptic to ovate-elliptic with the apex obtuse or rounded and the base obtuse, the 3 primaries deeply impressed above and elevated below, the numerous secondaries obscure above but elevated and prominently reticulate below, the ends of the secondaries sometimes anastomosing to form indistinct marginals; above rugose and sparsely strigulose, the hairs 1–2/mm.^{2} and to about 1 mm. long with the basal ½–⅔ adherent and the radicine bases abruptly expanded to 0.3–0.8 mm. diam.; below very densely strigulose to strigose on the primaries, the surface completely covered with loosely appressed or erect hairs 35–50/mm.^{2}, the smaller ones almost stellate. Flowers 5-merous, mostly ternate or with an additional pair at the node below the dichasial node, the persistent leaves subtending the dichasium somewhat reduced. Pedicel 0.5–1 mm. below bracts, 2–7 mm. above; pedicellar bracts early caducous, 6–7.5 × 2.5–3 mm., spatulate, above glabrous or sparsely strigulose apically, below densely strigulose. Hypanthium 6.5–9 × 4–7.5 mm., 0.3–1 mm. thick medianly, very densely strigose with the hairs to 2–3 mm. long. Sepals 5–7.5 × 3–5 mm., oblong-ovate with broadly acute apices, united at bases 0.9–1.2 mm., the sinuses acute. Petals deep purple, 12–20 × 8–13 mm., obovate and asymmetrical with broadly acute to obtuse apices, the cilia 0.2–0.8 mm. and obviously gland-tipped but the glands early-caducous, outside moderately strigulose 4–8/mm.^{2} (densely so at apex). Filaments 3.5–6 mm., as long as the anthers; connective at anther base 0.9–1.4 mm., free of the anther 0.5–0.6 mm., the ventral lobing 0.1–0.4 mm. Style 18–28 × 0.9–1.1 mm., exserted 5–13 mm., glabrous or with a very few setae on the basal ⅓. Ovary 5.5–8.5 × 3.5–4.5 mm., densely strigose or strigulose on the apical 2–4 mm., the apical lobes 0.6–1.5 mm. above the locules.

Type Collection and Locality: *Mathews 3210* p.p. (HOLOTYPE K); "in Peruvia Chachapoyas," Dept. Amazonas.

Type Photographs and Illustrations: Gleason 88-10 p.p. (holotype); Gleason 28-1 and F16707 (2 different sheets of destroyed type collection of *B. asperum* at B); Trans. Linn. Soc. 28: *pl. 3, f. 33d.*

Distribution: Dept. Cajamarca and Amazonas, Peru, alt. 3000–3700 m.

Cajamarca: between Chota and Cutervo, *Raimondi 3292* (USM); Hacienda La Tajona northwest of Hualgayoc, *Stork & Horton 10023* (F, UC), *Weberbauer 4013* (isotypes of *B. asperum* BR, G-DEL), *Weberbauer 4030* (G-DEL). Amazonas: Chachapoyas, *Mathews s.n.* anno 1838 (BR, G-BOIS, G-DEL, K, P).

It is quite possible that the type collection of *B. radula* actually should be cited as *Mathews s.n.*, and that the continental specimens are isotypes; a penciled line on the holotype sheet separates the holotype branch of *B. intermedium* along with the Mathews label bearing the number 3210 from the holotype branch of *B. radula.*

B. radula differs from *B. maximowiczii* in somewhat larger and constantly 5-merous flowers with markedly pubescent petals. *B. asperum* Cogniaux is an exact synonym of *B. radula* Triana; the anther connective is obviously prolonged, despite Cogniaux's assigning *B. asperum* to *sect. Adesmiae.*

11. **Brachyotum maximowiczii** Cogniaux; DC. Monog. Phan. 7: 154. 1891.

Trichomes as in *B. radula*. Branchlets obscurely quadrangular, very densely strigulose to short-strigose. Petiole 3–5 mm. or 8–11 mm. Blade 11–20 or 30–45 × 5–14 mm., elliptic with the apex broadly acute to rounded and the base narrowly obtuse, the 3 primaries impressed deeply above and elevated below, the secondaries above obscure but below elevated and laxly reticulate although mostly hidden by the pubescence; above sparsely strigulose to tuberculate-strigose, the hairs 1–3/mm.^{2} with the radicine bases expanded and 0.2–1 mm. diam. and the attenuate free apices 0.3–1.5 mm. long; below densely strigulose to strigose on the primaries, the surface very densely appressed-hirsutulous, the hairs 25–50/mm.^{2} with the smaller ones almost stellate. Flowers usually 4-merous (rarely predominantly 5-merous), ternate or with an additional pair of flowers at the node below the dichasial node, the dichasium subtended by persistent somewhat reduced leaves 6–12 × 3–6 mm. Pedicel 0.5–2.5 mm. below bracts, 2–7 mm. above; pedicellar bracts persistent or caducous, 3–7 × 1–3.5 mm., elliptic, above glabrous or apically sparsely strigulose, below densely strigulose. Hypanthium 4.5–6.5 × 3.5–5 mm., 0.3–0.5 mm. thick medianly, very densely long-strigulose to strigose 6–15/$mm.^2$ Sepals 4.5–6.5 × 3–5 mm., ovate to oblong-ovate with acute to narrowly obtuse and usually apiculate apices, united at bases 0.8–1.5 mm., the sinuses acute. Petals 10–18 × 8.5–12.5 mm., obovate and slightly asymmetrical with obtuse to rounded apices, the cilia 0.1–0.5 mm. and obviously gland-tipped but the glands early caducous. Filaments 4–6.5 mm., as long as the anthers; connective at the anther base 1–1.6 mm., free of the anther 0.5–0.8 mm., the ventral lobing 0.2–0.6 mm. Style 18–28 × 0.6–0.7 mm., exserted 5–10 mm. Ovary 4.5–7.5 × 2.5–4 mm., moderately to densely long-strigulose on the apical 1.5–3.5 mm., the apical lobes 0.6–1 mm. above the locules.

11a. Brachyotum maximowiczii var. maximowiczii.

Petiole 3–5 mm. Blade 11–20 × 6–11 mm.

Type Collection and Locality: *Mathews (Fielding) 1256* (HOLOTYPE presumably at LE; fragment of holotype BR; isotype (K); "in Peruvia ad Bajasan," Dept. Amazonas.

Distribution: Dept. Amazonas, Peru, alt. 2300–3000 m.

Chachapoyas, *Mathews 1260* (BR, K), *Mathews s.n. anno 1835* (K), *Mathews 45H* (K), *Mathews 47H* (K), *Mathews s.n. anno 1838* (G-BOIS, K); Cerro Puma southeast of Chachapoyas, *Pennell 15730* (PH); near Puente de Sigseg on Río Sonche above Molinopampa, *Pennell 15786* (PH).

11b. Brachyotum maximowiczii var. longifolium Wurdack, var. nov.

Petiolus 8–11 mm. Lamina 30–45 × 9–14 mm.

Type Collection and Locality: *Pennell 15857* (HOLOTYPE PH); Peru, Dept. Amazonas, Cerro de Fraijaco (Huaui-Huni) northeast of Tambo de Ventilla, in dry sandy soil, alt. 3000–3200 m., 7 Jul. 1948. "Shrub. Hypanthium and calyx jasper-red; petals black." Known only from the type collection.

Cogniaux described this species as 4-merous; on the holotype fragment examined, however, 6 of the 7 flowers were 5-merous; on the Kew isotype, all 15 examinable flowers were 4-merous. The leaf tubercles on the holotype fragment are somewhat more prominent than usual, but the variation in development of these hairs is quite great on the other collections. Among these other collections, except for *Mathews 47H*, all of the 81 examinable flowers were 4-merous. However, in *Mathews 47H*, half of the 16 examinable flowers were 4-merous, half 5-merous; this collection also has leaves with the length/width ratio greater than usual in the typical variety, narrower more acute sepals, and smaller connective prolongation (0.7–0.9 mm., free of anther 0.3 mm.). Perhaps the holotype fragment and *Mathews 47H* are hybridal variants (×*B. angustifolium* ?).

Both varieties of *B. maximowiczii* are in appearance quite distinct from *B. radula*, the typical variety because of the smaller leaves, *var. longifolium* because of the leaf blade length/width ratio of 2.6–3.3 [rather than 1.5–2(–2.4)]. The lower leaf surface reticulation is also much less obvious (or completely hidden in *var. longifolium*) than in *B. radula*.

12. Brachyotum racemosum Cogniaux, Bot. Jahrb. 42: 132. 1908.

Trichomes smooth. Branchlets rounded-quadrangular, very densely loose-slender-strigose, the hairs persistent and to 2 mm. long. Petiole 7–15 mm. Blade 30–75 × 10–30 mm., elliptic with the apex acute to rounded-acute and the base broadly acute to obtuse, with the 5 primaries and 20–50 pairs of secondaries narrowly impressed above and elevated below but obscured by the pubescence; above densely loose-strigose, the slender hairs 4–9/mm.^{2} and each on a low mamma with the basal ⅕–⅓ adherent; below very densely loose-sericeous-strigose 30–50/mm.^{2} Inflorescence with a terminal dichasium and an additional pair of flowers at the bi-leaved node below the dichasial node, often with another pair of flowers at the next-lower persistently bi-leaved node and then the leaves of the penultimate peduncular node very early caducous; the pair of bracts at the base of the terminal dichasium similar to the floral bracts but slightly larger (16 × 14 mm.) and caducous just before anthesis. Flowers 5-merous, each closely invested by a pair of persistent bracts inserted at the immediate base of the hypanthium. Pedicel 3 mm. to as much as 14 mm. (in the lower axillary flowers) below bracts; floral bracts 10–11 × 13 mm., suborbicular with obtuse short-apiculate apices, outside densely fine-strigulose on central ¼–½, toward the margins and inside glabrous, the marginal cilia minute. Hypanthium 8–10 × 10–11 mm., 0.5 mm. thick medianly, very densely sericeous-strigose with the hairs to 8 mm. long. Sepals 5.5–6 × 6–7 mm., broadly ovate with the apices obtuse and apiculate, united at bases 2.4–2.8 mm., the sinuses broadly acute. Petals greenish-white, 16–18 × 14–17 mm., asymmetrically obovate with the apices truncate to slightly oblique, the cilia 0.1–0.7 mm. (the terminal one 1–1.5 mm.) and gland-tipped but the glands rather early caducous. Filaments 7–9.5 mm.; anthers 5–6 mm.; connective at anther base 1–1.2 mm. but scarcely (only 0.1–0.3 mm.) free of the anther, the ventral lobes 0.3–0.6 mm. Style 20–24 mm. long and tapering from 0.7–1.3 mm. diam. basally to 0.4 mm. apically, exserted 4 mm. Ovary 7.5 × 6 mm., very densely short-strigose on the apical 4.5–5 mm., the apical lobes 0.8 mm. above the locules.

Type Collection and Locality: *Weberbauer 4170* (LECTOTYPE BR; isotype G-DEL); "in provincia Chota, in montibus ad occidentem a Huambos versus,... 3100–3200 m. s. m.,", Dept. Cajamarca, Peru.

Type Photographs: Gleason 28-6 and F16714 (destroyed holotype at B).

Distribution: Dept. Cajamarca, Peru, alt. 3000–3300 m.

Cutervo, *Raimondi 3012* (USM); Llama, *Sandeman 4177* (K), *Sandeman 4197* (K).

The flowers were originally described as 4-bracteate. On all specimens examined, however, there are 2 bracts per flower, but the 2 bracts at the base of the compact terminal dichasium so closely invest these 3 flowers until anthesis that only a careful examination shows the true number of floral bracts. *B. racemosum* is most closely related to *B. gleasonii*, but differs in the smooth trichomes, greater sepal union, more conspicuous and differently shaped floral bracts, and longer hypanthial pubescence. These two species have the largest hypanthia of all species in the genus.

13. **Brachyotum gleasonii** Wurdack, sp. nov.

Trichomata minute modiceque aspera. Ramuli novelli obscure quadrangulati cum petiolis pedicellisque dense hirsutuli vel laxo-brevi-strigosi. Petiolus (6–)10–25 mm. Lamina 30–75 × 10–35 mm. elliptica vel lanceolato-elliptica apice acuta vel anguste obtusa basi obtusa, nerviis primariis 5 (aut 3–5 distinctioribus cum marginum duobus additis plus minusve indistinctis) supra anguste impressis subtus expressis secundariis utrinque 20–25 supra et subtus ab piliis occultis; supra dense laxo-gracili-strigosa, pilis 3–11/mm.^{2} basi per ⅕–¼ adhaerentibus; subtus modice hirsuta vel laxo-gracili-strigulosa 5–15/mm.^{2}, glandulis solitariis sparsis. Flores 5-meri plerumque terni vel triterni, cum foliis duobus ad basim dichasii. Pedicellus sub bracteis 3–10 mm., super 2–4(–10) mm.; bracteae 5–9 × 2–4.5 mm. ellipticae caducae vel persistentes, supra in parte ⅓–⅔ apicali strigulosae basim versus glabrae, subtus modice strigulosae. Hypanthium 6–9 × 7–9 mm., medio 0.4–0.5 mm. crassum, densissime hirsutum vel laxo-strigosum, pilis 8–20/mm.^{2} et ad 2 mm. longis. Sepala 5–9 × 4.5–6 mm. ovata vel oblongo-ovata apice late acuta vel anguste obtusa et breviter apiculata base per 0.7–1 mm. cohaerentia, sinu acuto. Petala 16–19 × 14–18 mm. obovata apice rotunda vel leviter obliquo-truncata, ciliis 0.2–0.7 mm. (uno terminali 0.7–1.1 mm.) non-glandulosis. Filamenta 7–9 mm.; antherae 5.5–8 mm.: connectivum basi antherae non vel vix (per 0.1 mm.) ab anthera liberum. Stylus 20–25 mm. longus, basi 1–1.4 mm. apice 0.5–0.7 mm. diam., per 2–5 mm. exsertus. Ovarium 6–7.5 × 4–5 mm. apice per 3–4 mm. dense strigulosum, lobis apicalibus super loculos 0.5–2 mm.

Type Collection and Locality: *Camp E-4118* (HOLOTYPE NY); Ecuador, Chimborazo-Cañar border (western escarpment), near Pimo, alt. 10200–10400 ft., 9 Jul. 1945. "Tree 6 m. Lvs dark green, nitid under pubescence above; bright green below. Stems, petioles, and veins below deep red. Calyx deep crimson. Corolla white, faintly tinged with yellow, of the tubular type which is pendant and does not open fully."

Distribution: central Ecuador, alt. 3000–3100 m.

Pichincha: Pichincha near "Frutillas," *Sodiro 469* (BR); Atacazo, *Sodiro 473b* (BR). Bolivar: near Chunchi, *Rimbach 352* (MICH, S).

Cogniaux had annotated the Sodiro collections, one as a new species and the other as a variety of *B. ledifolium*, but these names were never published. *B. gleasonii* is closely related to and intermediate between *B. racemosum* and *B. ledifolium*. From the latter, the cited collections may be distinguished by the much less shaggy trichomes, larger leaves, longer hypanthial pubescence, usually larger pedicellar bracts, generally larger flowers, and denser ovary pubescence. Especially striking is the absence of the graduated short pseudo-stellate hairs so characteristic of the lower leaf surface in *B. ledifolium*; these hairs, in *B. gleasonii*, are slender, rather flexuous, and inconspicuously roughened.

14. **Brachyotum ledifolium** (Desr.) Triana, Trans. Linn. Soc. 28: 48. 1871.

Melastoma ledifolia Desr. in Lam. Encyc. 4: 48. 1796.
Rhexia canescens Bonpl. Rhexies 14. 1806–1808.
Chaetogastra canescens (Bonpl.) DC. Prodr. 3: 134. 1828. Non sensu Naudin, Ann. Sci. Nat. III. 14: 135. 1850.
Pleroma ledifolium (Desr.) DC. Prodr. 3: 151. 1828.
Alifana canescens (Bonpl.) Raf. Syl. Tell. 101. 1838.
" *?Lasiandra ledifolia*" (Bonpl.) Naudin, Ann. Sci. Nat. III. 13: 159. 1849.
Chaetogastra sulphurea Naudin, Ann. Sci. Nat. III. 14: 135. 1850.
Chaetogastra bonplandiana Naudin, Ann. Sci. Nat. III. 14: 137. 1850.
Brachyotum canescens (Bonpl.) Triana, Trans. Linn. Soc. 28: 48. 1871.
Brachyotum sulphureum Triana, Trans. Linn. Soc. 28: 166. 1871. (?) Nomen nudum.

Trichomes notably shaggy-plumulose. Branchlets rounded-quadrangular, densely to moderately and rather persistently loose-strigulose. Petiole (2–)4–7 mm. Blade (9–)15–25(–40) × (5–)7–12(–15) mm., elliptic to ovate with the apex acute to obtuse and the base obtuse to subtruncate, the 3 primaries narrowly impressed above and elevated below, the 10–15 pairs of secondaries obscurely impressed above and elevated below; above sparsely to densely short-strigulose to short-strigose, the hairs 1–20/mm.^{2} and $\frac{1}{5}$–$\frac{1}{3}$ adherent with their bases not markedly expanded; below densely to very densely hirsutulous, the hairs (10–)30–60/mm.^{2} and of varying lengths with the very numerous shorter ones appearing almost stellate due to much-contracted axes, giving a sparkling appearance to the surface (sub lente), the glands solitary and 20–30/mm.^{2} but obscured by the hairs. Flowers 5-merous (very rarely a few 4-merous), mostly solitary on short bi-bracteolate pedicels in opposite upper leaf axils, rarely the terminal ones ternate with the peduncle not differentiated, or solitary and terminal. Pedicel 4–9 mm. below the bracteoles, 1–5 mm. above; pedicellar bracteoles 3.5–5 × 2–4 mm., rarely leaflike to 11 × 6 mm., elliptic, above glabrous or apically strigulose, below as the leaves, early caducous or persistent until just after anthesis. Hypanthium 4–8 × 4–6 mm., 0.4–0.7 mm. thick medianly, very densely strigulose to short-strigose 15–30/mm.^{2} Sepals (4–)5–7 × 3–4.5 mm., ovate-oblong with the apices obtuse to rounded, united at bases 0.4–1.2 mm., the sinuses narrowly acute or rounded, sometimes with a few longer sinal hairs to 1–2 mm. Petals pale yellow, 9–17 × 9–15 mm., asymmetrically obovate with the apices obliquely truncate to very broadly obtuse, the cilia 0.1–0.5 mm. (terminally to 0.6–1 mm.) and non-glandular (rarely a few of the basal cilia with early-caducous glandular tips). Filaments 5–9.5 mm.; anthers 4–9 mm.; connective at anther base 0.5–0.8 mm. wide but almost always not at all prolonged nor free of the anther. Style 17–25 × 0.5–0.8 mm., exserted 2–8 mm. Ovary 5–7.5 × 3–4.5 mm., sparsely strigulose on the apical 1.5–3 mm., the apical lobes 0.5–1.5 mm. above the locules.

Type Collection and Locality: *J. de Jussieu s.n.* (HOLOTYPE presumably in Herb. de Jussieu at P). Since de Jussieu began his Andean collecting in northern Ecuador and visited Quito, the type locality is probably somewhere in this area, perhaps the slopes of Pichincha which are readily accessible from Quito and from which subsequently have been collected many specimens which duplicate the type photograph.

Type Photographs and Illustrations: F36131 (presumed holotype); F36136 (presumed holotype of *Rhexia canescens* at P); F36130 (presumed holotype of *Chaetogastra sulphurea* at P); F36129 (presumed holotype of *Chaetogastra bonplandiana* at P); Rhexies *pl. 6*, not *pl. 18* (1806–1808) (as *Rhexia canescens*); Ann. Sci. Nat. III. 14: *pl. 4*, *f. 6* (as *Chaetogastra bonplandiana*); Trans. Linn. Soc. 28: *pl. 3*, *f. 33e* (as *Brachyotum sulphureum*. The assignment of this name and drawing to *B. ledifolium* is questionable, since the flower shown is 4-merous and the anthers minutely tuberculate.)

Distribution: central Colombia to central Ecuador, alt. 2600–4200 m.

COLOMBIA: Cundinamarca: Páramo San Fortunato between Bogotá and Fusagasuga, *André 1018* (BR, K, NY); near Sibate, *Holton 911* (G-BOIS, K, NY, PH), *Linden 820* (BR, G-BOIS, G-DEL, P, W); El Peñon, *André 1464* (K), *Pennell 2409* (NY); Fusagasuga, *Purdie s.n.* (GH, K); Páramo de Sumapaz, *Fosberg 20825* (NY, NA). Cauca: Páramo de Moras between Mozoco and Pitayó, *Pittier 1343* (NY, US); between Silvia and Pitayó, *Core 58* (NY, NA); near Silvia, *Haught 5108* (NY, US), *Yepes 242* (US); Páramo de las Delicias, *Dryander 2715* (F, NY); Páramo de Guanacas, *Lehmann 6377* (K); near Popayán, *Lehmann 8650* (F, K, NY); near Puracé, *André 556* (K), *Pérez & Cuatrecasas 5901* (F, NY, US), *Bonpland s.n.* (isotypes of *Rhexia canescens* F, G-DEL, P), *Cuatrecasas 14667* (F, NY), *Dryander 1728* (US), *von Sneidem 1832* (S), *von Sneidem 1835* (S), *von Sneidem 2457* (S); between Paletará and Calaguala, *Pennell 7087* (GH, NY, PH, US); Paletará, *Pennell 7072* (GH, NY, PH, US). Huila: Huila, *Dryander 1074* (NY, US). Nariño: Volcán El Galeras, *Schultes & Villarreal 7999* (NY); Guaco de Pasto, *Karsten s.n.* (W); between Sibundoy and Pasto, *Schultes & Villarreal 7528* (NY, US); Tuquerres, *Espinosa 3137* (NY), *Karsten s.n.* (BR, W); Guachucal, *Balls 5773* (UC, US). Putumayo: Laguna de la Cocha near Santa Lucía, *Cuatrecasas 11823* (NY, US).

ECUADOR: Carchi: Volcán Chiles, *Camp E302* (NY); Páramo del Azufral east of El Angel, *Mexia 7527* (NY, US); La Rinconada between Ibarra and Tulcán, *Hitchcock 20778* (GH, NY, US). Imbabura: Cuicocha, *Acosta 11039* (F), *Acosta 11345* (F); near Otavalo, *Acosta 8062* (F); San Miguel, *Wiggins 10363* (NY). Pichincha: between Nono and Cotocallao, *Mexia 7711* (GH, NY, S, UC, US); Pichincha, *Couthouy s.n.* (GH, NY), *Ewan 16385* (NY), *Hall 20* (K), *Holmgren 501* (S), *Jameson s.n. (or 262 ?)* (isotypes of *Chaetogastra sulphurea* F, G-BOIS, G-DEL, K, L, W), *Jameson 531* (P), *Mexia 6803* (NY, US), *Sodiro 471a* (BR), *Sodiro 471b* (BR), *Steyermark 52348* (F); near Quito, *Karsten s.n.* (BR, W), *Lehmann 184* (BR, G-BOIS); east of Ungu, *Firmin 197* (F, NY, US); near Lloa, *Asplund 8632* (S); Santa Rosa in the Chillo valley (south of Alangasí ?), *Anthony & Tate 211* (US); Antisanilla, *Anthony & Tate 352* (US); Gualilagua near El Corazón, *Acosta 7116* (F). Cotopaxi: Cotopaxi, *Asplund 6371* (G-DEL, S, US), *Rowlee & Mixter 1127* (US); between Pilaló and Zumbagua, *Haught 2947* (NY, US). Napo-Pastaza: Papallacta, *Heinrichs 601* (G-DEL). Bolívar: Urcu-corral, *Acosta 6616* (F). Tungurahua: near Ambato, *Pachano 178* (GH, NY, US); various localities but especially near Ambato, *Spruce 5147* (BR, F, G-BOIS, G-DEL, GH, K, NY, P, S, W); Carihuairazo, *Rorud s.n.* (F); near "Páramo of Minza," *Penland & Summers 339* (F, NY); "Sec. Alta de Pasa," *Acosta 8737* (F); near Mocha, *Sodiro 468* (BR). Chimborazo: between Urbina and Mocha, *Asplund 6926* (S); near Riobamba, *Sandeman 53* (K), *Schimpff 802* (A, G-DEL); Cubillín (east of Licto), *Acosta 7533* (F), *Acosta 7534* (F); between Pungalá and Cusúipaccha, *Scolnik 1534* (NY); Calaguín near Sibambe, *Acosta 5483* (F); between Las Cochas and Pagma north of Huigra, *Wiggins 11027* (NY). Without province: eastern Cordillera, *Rimbach 9* (A, F, GH, NY, US), *Rimbach 82* (A, F), *Rimbach 236* (NY, US).

WITHOUT LOCALITY: *Bonpland s.n.* (fragment of presumed holotype of *Chaetogastra bonplandiana* F); *herb. Ruiz & Pavón s.n.* (F); *herb. Ventenat s.n.* (possible isotype of *Melastoma ledifolia* G-DEL).

Vernacular Names: Sarzilejo (Bonpl. Rhexies); Puca Chaglla *(Steyermark 52348)*; Illinche *(Acosta 8737)*; Pucafichana *(Acosta 8062)*; Rumbra *(Acosta 7533)*; Zarzillejo *(Dryander 2715)*; Puka-shakia (Quito, *Lehmann* 6377).

One of the several Bonpland sheets seen from Paris was labeled "Loxa," but this sheet seems to be part of the same collection as the Bonpland Puracé specimens. The herb. Ventenat specimen (G-DEL) is probably an isotype of *Melastoma ledifolia*, since the sheet, according to the label, was given to Ventenat by Lamarck in whose publication Desrousseaux's description appeared. The herb. Ruiz & Pavón specimen (F) was probably collected by Tafalla in Ecuador.

From the type photograph of *Melastoma ledifolia*, which indicates that A. L. de Jussieu's herbarium was not given to Paris until 1857, and from Naudin's questioning the transfer of this species to *Lasiandra*, it is evident that Naudin had not seen the J. de Jussieu holotype of this species; if he had seen this collection, the Jameson collection upon which *Chaetogastra sulphurea* was based would likely have been placed under Desrousseaux's species. The isotype of *Chaetogastra rostrata* (F38256) in the Jussieu herbarium also was not annotated by Naudin, although he described that species from another sheet of the same Dombey collection at Paris.

In *Wiggins 11027*, *Acosta* 7534, and *Haught 2947*, the ventral lobes of the connective are free of the anther 0.1–0.5 mm., but otherwise these collections agree perfectly with the vast majority of other collections. No demarcation can be made between specimens with the leaves smaller and more generally ovate and the upper leaf surface densely pubescent (many Colombian collections) and those with larger elliptic leaves and the upper leaf surface sparsely strigulose (many Pichincha collections); every modification between these two mild extremes exists. *Rhexia canescens* and *Chaetogastra bonplandiana* generally belong to the former category, *Melastoma ledifolia* and *Chaetogastra sulphurea* to the latter. Lagerheim (1899) noted the variability of these characters in various ecologic niches on the slopes of Pichincha.

In addition to *B. gleasonii*, *B. ledifolium* seems to be also related to *B. radula* and *B. maximowiczii*; these Peruvian species differ in the petal color and shape, the connective prolongation, the strictly appressed pubescence on stems and lower leaf surface primaries, and the much broader-based trichomes on the upper leaf surface.

15. **Brachyotum weberbaueri** Cogniaux, Bot. Jahrb. 42: 133. 1908.

Trichomes markedly shaggy. Branchlets rounded-quadrangular, densely and persistently fine-hirsutulous, the hairs to 1.5 mm. long. Petiole 8–10 mm. Blade 17–30 × 6–13 mm., elliptic with the apex blunt-acute and the base acute, the 3 primaries impressed above and elevated below, the 30–35 pairs of secondaries obscure above and mostly obscured by the pubescence below; above densely tuberculate-strigulose, the hairs 8–10/mm.^{2} and in 20–30 irregular rows at the widest part of the blade with their bases 0.3–0.4 mm. diam. and their abruptly attenuate tips to 0.4 mm. long; below very densely hirsutulous, the larger hairs to 1 mm. long and about 15/mm.^{2} intermingled with a dense (35–40/mm.^{2}) covering of minute pseudo-stellate hairs. Flowers 4-merous, ternate or with an additional pair at the node below the dichasial node, the slightly reduced leaves subtending the dichasium caducous usually just after anthesis. Pedicel 0.5–1 mm. below bracteoles, 1–3 mm. above; pedicellar bracteoles 3–4.5 × 0.8–1.3 mm., oblong-lanceolate, caducous usually just after anthesis, above glabrous, below moderately loose-strigulose. Hypanthium 3.5–4.5 × 4–4.5 mm., 0.3 mm. thick medianly, densely ascending-hirsutulous, the hairs 14–16/mm.^{2} with their bases 0.3–0.6 mm. diam. and their rather abruptly long-attenuate apices to 2 mm. long. Sepals 3.5–4 × 3–4 mm., triangular with acute apices, united at bases 0.5 mm., the sinuses acute. Petals "viridia margine violacea," 11–13 × 9–10 mm., obovate with the apices obliquely truncate, the marginal cilia 0.3–0.8 mm. and with rather caducous glandular tips. Filaments 3.5–4.5 mm.; anthers 2.5–3 mm.; connective at anther base 0.8–0.9 mm. wide but not at all prolonged nor free of the anther. Style 15–20 × 0.8 mm., exserted 6 mm. Ovary 4 × 3 mm., sparsely short-strigulose on the apical 1.5–2 mm., the apical lobes 0.5 mm. above the locules.

Type Collection and Locality: *Weberbauer 4405* (LECTOTYPE BR; isotype G-DEL; fragment F); Peru, Dept. Amazonas, "Tambo Ventillas, ad orientem a Chachapoyas versus," alt. 2400–2600 m. Known only from the type collection.

Type Photographs: Gleason 28-7 and F16720 (destroyed holotype at B).

The closest relative of *B. weberbaueri* seems to be *B. ledifolium* which has similar lower leaf surface hairs, petal shape, and ovary; however, the affinity is distant. In many respects, *B. weberbaueri* suggests a linkage to *B. angustifolium*, the sepals, petals, and inflorescence being somewhat similar; the peduncles, while stout and not differentiated, are partially cernuous.

16. **Brachyotum gracilescens** Triana, Trans. Linn. Soc. 28: 49. 1871.

Trichomes smooth. Young branchlets quadrangular, sparsely strigulose and soon glabrescent, the nodal patent hairs to 2 mm. long. Petiole 5–10 mm. Blade 20–60 × 10–25 mm., ovate with the apex acute and base obtuse to rounded-truncate, thin and i.s. plane or somewhat rugose, the 3 primaries and 15–20 pairs of secondaries narrowly impressed above and narrowly elevated below; above very sparsely short-strigose or long-strigulose with broad glabrous strips along the primaries, the slender hairs mostly 1–2/mm.^{2} (occasionally as dense as 5–6/mm.^{2}) with their basal ⅕–⅓ adherent; below sparsely to very sparsely loose-slender-long-strigulose along the veins, the surface glabrous except for the sparse (3–15/mm.^{2}) solitary glands. Flowers 4-merous, solitary, binate, or ternate on long (20–30 × 0.5 mm.) slender peduncles from opposite upper leaf axils, the bracteoles at the peduncular apex 1.5–3 × 0.3–0.6 mm. and early caducous. Pedicel 3–11 mm. below bracteoles, 1–5 mm. above; pedicellar bracteoles 1–1.5 × 0.2 mm., glabrous except for the appressed cilia and a few hairs abaxially on the single vein, very early caducous, absent in uniflorous inflorescences and usually absent in the center flower of the dichasium. Hypanthium 4–5 × 4–4.5 mm., 0.2–0.3 mm. thick medianly, sparsely strigulose, the slender hairs 3–5(–9)/mm.^{2} Sepals 3–4.5 × 3.5–5.5 mm., the apical 2–3.5 mm. broadly subulate and 1.5–2.5 mm. wide, the apices short-apiculate, united at bases 0.2–0.7 mm., the sinuses acute, outside glabrous except for a few hairs on the basal ⅓–½ of the midrib. Petals carmine to basally white with bright rose margins, 12–19 × 10–15 mm., asymmetrically obovate with the apices broadly rounded to obliquely truncate, the midvein sometimes with a small apiculus, the non-glandular cilia 0.1–0.4 mm. (the terminal one 0.6–1 mm.). Filaments 5–9 mm.; anthers 3.5–7.5 mm.; connective at anther base not at all extended nor free of the anther. Style 17–24 × 0.6–0.8 mm., exserted 2–6 mm. Ovary 4–5 × 2–2.5 mm., sparsely strigulose on the apical 0.3–1 mm. with conic setae, the apical lobes 0.2–0.4 mm. above the locules.

Type Collection and Locality: *Spruce 6084* (HOLOTYPE K; isotypes BR, G-BOIS, G-DEL, GH, P, S, W); "in silvis montis Tunguragua alt. 10,000 ped." (fide holotype), Prov. Tungurahua, Ecuador.

Type Photographs: Gleason 87-5 (holotype); F16710 (destroyed isotype at B).

Distribution: central to southern Ecuador, alt. 2400–3000 m.

Tungurahua: between "Leito y La Cima," *Acosta 9075* (F). Azuay: near Sevilla de Oro, *Camp E-4586* (NY). Loja: "Cerros de Acacana" about 30 km. north of Loja, *Espinosa E1437* (NY).

B. gracilescens and its relatives, *B. fraternum* and *B. rugosum*, form a group whose other relationships are obscure; they are somewhat suggestive of *B. rostratum* and its relatives in the slender peduncles, obtuse to truncate petals, and etuberculate anthers; however, the smooth hairs and/or large leaves are anomalous.

17. **Brachyotum fraternum** Wurdack, sp. nov.

Trichomata laevia. Ramuli novelli quadrangulati cum petiolis pedicellisque modice laxo-strigulosi. Petiolus 3–5 mm. Lamina 10–15 × 5–8 mm. ovata vel elliptico-ovata apice acuta basi obtusa, nervis primariis 3 supra impressis subtus expressis, secundariis 10–15-jugis supra invisis subtus obscure expressis et laxe reticulatis; supra modice strigulosa, pilis gracilibus 4–6/mm.^{2} per dimidium basalem adhaerentibus; subtus in nervis primariis sparse strigulosa, nervis secundariis superficieque sparsissime strigulosis, punctis nigris 4–7/mm.^{2} ex glandularum acervulis compositis. Inflorescentiae oppositae in axillis foliorum superiorum; flores 4-meri saepe terni; pedunculus gracilis efoliatus 7–15 × 0.5 mm., apice bracteis duabus ascendentibus singulis 3.5–4 × 2.5–3 mm. ovato-triangularibus supra glabris marginibus sparse appresso-ciliatis subtus per costam sparse strigulosis aliter glabris; pedicelli 1–3 × 0.4–0.5 mm. ebracteolati. Hypanthium 4.5–5 × 4.5–5 mm., medio 0.3 mm. crassum, sparse brevi-strigulosum 7–9/mm.^{2} Sepala 5–5.5 × 4–4.5 mm. ovata-oblonga apice acuta basi 1 mm. cohaerentia, sinu acuto. Petala 13–14 × 8.5–11 mm. asymmetrice obovata apice late obtusa vel rotunda, ciliis glandulosis (glandulis valde caducis) 0.1–0.2 mm. longis. Filamenta 7–8 mm.; antherae 5–6 mm.; connectivum basi antherae non productum nec liberum. Stylus 19–20 × 0.5 mm., per 6–7 mm. exsertus. Ovarium 5 × 3.5 mm., apice per 2 mm. sparsissime brevi-strigulosum setis conicis, lobis apicalibus super loculos 0.4 mm.

Type Collection and Locality: Camp E-4871 (HOLOTYPE NY); Ecuador, Azuay-Oriente border, Páramo del Castillo and surrounding forested areas, crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez, alt. 11000–11300 ft., 21 Aug. 1945. "Series of loose straggling shrubs, rarely more than 1 m. high. Lvs deep green above, pale below, nitid on both sides. Hypanthium and lobes pale green, often reddish-tinged above. Corolla urceolate in outline. Petals white (greenish-tinged in bud and pale green along the veins at anthesis), margin —sometimes to depth of 1 mm.—outlined in deep purple, this character standard for all plants seen and evident even in young buds." Known only from the type collection.

B. fraternum is very closely related to *B. gracilescens*, but differs in the much smaller leaves, shorter peduncles, broader peduncular bracts, all flowers in the dichasia without pedicellar bracteoles, and the glands on the under surfaces of the leaves in small clusters turning black with age. In all ways, this species seems to be a much-reduced higher-altitude version of *B. gracilescens*.

18. Brachyotum rugosum Wurdack, sp. nov.

Trichomata modice muriculata. Ramuli novelli obscure quadrangulati modice longo-strigulosi tarde glabrescentes. Petiolus 7–13 mm. Lamina 24–50 × 13–25 mm. ovata apice acuta basi obtusa vel subtruncata, rugosa, nervis primariis 5, secundariis reticulatis, omnibus supra anguste impressis subtus anguste expressis; supra sparse strigosa (secus nervos primarios glabra), pilis 2/mm.^{2} basi $\frac{1}{3}$ adhaerentibus et leviter expansis (ad 0.2 mm. diam.); subtus in nervis primariis dense strigosa, in venulis sparse laxo-brevi-strigosa, glandulis solitariis sparsis 2/mm.^{2}, aliter glabra. Flores 4-meri bini, inflorescentiis in axillis oppositis foliorum superiorum; pedunculi pedicellorumque bracteolae valde caducae non visae; pedicellus 1–2.5 mm. sub bracteolis, 3–5 mm. super. Hypanthium 4 × 4.5 mm., medio 0.2 mm. crassum, sparse laxo-gracili-brevi-strigulosum 7–9/mm.^{2} Sepala 4.5–5 × 4–4.5 mm. apice subulata (3 × 1.5 mm.) basi per 0.7 mm. cohaerentia lobis basi expansis, sinu obtuso. Petala 11–12 × 9–10 mm. obovata apice late asymmetriceque obtusa, ciliis 0.1–0.3 mm. (terminali 0.7 mm.) non-glandulosis. Filamenta 5–5.5 mm.; antherae 4.5–5.5 mm.; connectivum basi antherae 0.6–0.7 mm. minute (per 0.1–0.2 mm.) liberum, lobis ventralibus 0.1–0.2 mm. Stylus 18 × 0.6–0.7 mm., per 5 mm. exsertus. Ovarium 4.5 × 2.5 mm. apice per 2 mm. sparse brevi-strigulosum setis conicis, lobis apicalibus super loculos 0.9 mm.

Type Collection and Locality: *Steyermark 54316* (HOLOTYPE F; isotypes NY, US); Ecuador, Prov. Santiago-Zamora, trail between Pailas and El Pan, alt. 2255–3445 m., 10 Sept. 1943. "Shrub 5 ft. tall; fls nodding; petals dark purple; filaments lavender; anthers whitish; leaves rugose both sides, dark green above, dull green below." Known only from the type collection.

B. rugosum is more suggestive of the *B. rostratum* complex than either of its relatives, but differs considerably in its large rather thin leaves, eglandular petal cilia, and much less prominently roughened hairs. From its nearest relatives, *B. gracilescens* and *B. fraternum*, it differs in the roughened hairs, 5-nerved leaves, narrower calyx lobe apices, and longer ovary lobes. The flower dissected was from the New York isotype.

19. Brachyotum microdon (Naudin) Triana, Trans. Linn. Soc. **28**: 49. 1871.

Chaetogastra microdon Naudin, Ann. Sci. Nat. III. **14**: 132. 1850.
Chaetogastra pentlandii Naudin, Ann. Sci. Nat. III. **14**: 133. 1850.
Chaetogastra hermannioides Naudin, Ann. Sci. Nat. III. **14**: 133. 1850.
Brachyotum pentlandii (Naudin) Triana, Trans. Linn. Soc. **28**: 49. 1871.
Brachyotum hermannioides (Naudin) Triana, Trans. Linn. Soc. **28**: 49. 1871.
Brachyotum setosum Gleason, Mem. N. Y. Bot. Gard. **7**: 314. 1927.

Trichomes minutely but densely roughened. Branchlets quadrangular, sparsely to densely strigulose to loose-strigulose. Petiole 4–20 mm. Blade 15–85 × 8–40 mm., elliptic or elliptic-lanceolate to ovate with the apex acute to rounded and the base obtuse to subtruncate, thinly coriaceous to chartaceous, the 3 primaries thinly impressed above and elevated below, an additional pair of marginals more or less distinctly developed, the numerous soon-reticulate secondaries obscure above and obscurely elevated below; above sparsely to moderately strigulose or strigose, the hairs 1–15/mm.^{2} with the basal $\frac{1}{5}$–$\frac{1}{3}$ adherent and not abruptly expanded; below sparsely to moderately hirsute or strigulose (1–)2–15(–25)/mm.^{2}, the glands solitary and sparse to very dense 5–80/mm.^{2} Flowers constantly 5-merous, mostly ternate, sometimes with a pair of additional flowers at the node below the dichasial node or with still another pair at the next-lower node, occasionally the dichasia ternate, the dichasia subtended by persistent slightly reduced leaves. Pedicel 2–60 mm. below the bracteoles, 3–15 mm. above; pedicellar bracteoles (or bracts) 5–25 × 1–8 mm., 3-nerved, linear or narrowly elliptic to spatulate or narrowly ovate, sometimes leaflike, caducous in late bud or persistent until fruit, pubescent as the leaves or the smaller glabrous above. Hypanthium 5–9 × 4–8 mm., fleshy and 0.5–1.4 mm. thick medianly, moderately to densely short- to long-strigulose, the hairs (10–)15–25(–40)/mm.^{2} Sepals (3–)4–6(–7) × (3–) 4–5 mm., united at bases 1–2(–3) mm., the lobes acuminate-triangular to triangular, the sinuses broad and rounded. Petals deep purple, (14–)16–19(–23) × (11–)13–16 (–21) mm., asymmetrically obovate with the apices very broadly obtuse to almost truncate and with small midvein acumens, the cilia 0.1–0.4 mm. (the terminal few to 1 mm.) and tipped with inconspicuous early-caducous glandular tips. Filaments (4–)5–7 mm., as long as the anthers; connective at anther base 1–1.8 mm., free of the anther 0.3–0.7 mm., the ventral lobing 0–0.6 mm. Style 20–36 × (0.5–)0.8–1.3 mm., apically tapered usually noticeably, exserted 4–15 mm. Ovary 5.5–10.5 × 3.5–5 mm., moderately to densely strigulose to short-strigose on the apical 3–7 mm., the apical lobes 1–4.5 mm. above the locules.

Type Collection and Locality: *D'Orbigny 481* (HOLOTYPE P); near "Carcuata-Yungas." This locality is perhaps Circuata, Dept. La Paz, Bolivia.

Type Photographs and Illustrations: F36132 (HOLOTYPE); New York s.n. (holotype of *Chaetogastra hermannioides*); F36128 (isotype of *Chaetogastra hermannioides* at P); F36138 (presumed holotype of *Chaetogastra pentlandii* at P); New York s.n. (holotype of *Brachyotum setosum*); Ann. Sci. Nat. III. 14: *pl. 4, f. 6* (1850) (as *Chaetogastra hermannioides*).

Distribution: northwestern Bolivia to extreme northwestern Argentina, alt. 1900–3800 m.

BOLIVIA: La Paz: near Pelechuco, *Pearce s.n.* (K), *R. S. Williams 2471* (NY); between Ocara and Ancoma, *Tate 860* (NY); Tusuhuaya, *Cardenas 1315* (NY); near Sorata, *Mandon 641* (BR, G-BOIS, K, P, S, W), *Weddell s.n.* (P); "San Felipe" in Prov. Sur Yungas, *Asplund 1803* (S); near Unduavi, *Asplund 1845* (S), *Buchtien 219* (F, G-DEL, GH, K, NY, SI), *Buchtien 2916* (BR, US), *Eyerdam 25368* (F, G-DEL, UC), *Julio 325* (US), *Rusby 2340* (F, G-BOIS, GH, MICH, NY, P, PH, US); base of Illimani, *Pentland s.n.* (isotype of *Chaetogastra pentlandii* P; fragment F); "Nequejahuira" in Cordillera Real, *Tate 660a* (NY); Caracoles, *Nichols & Eggers s.n.* (F); near Pongo, *Tate 187a* (NY), *White 151* (holotype of *B. setosum* NY; isotypes GH, MICH, PH, US). Cochabamba: "Sailapata" in Prov. Ayopaya, *Cardenas 3056* (GH, P, S, US), *Cardenas 3214* (F); Yungas, *Bang 695* (F, G-BOIS, GH, MICH, NY, PH, US, W); below "Llanta Aduana" in Prov. Chapare, *Balls B6277* (GH, NY, UC, US); "Plumerito" between Colomi and Tablas, *Cardenas 3981* (US); Incachaca, *Werdermann 2015* (S); near Colomi, *Balls B6249* (GH, NY, UC, US); Sacaba, *Steinbach 5948* (F, LIL, NY, SI); Cochabamba, *Bang s.n.* (NY, US); near Pocona, *Steinbach 8667* (F, GH, K, NY, S). Santa Cruz: between Comarapa and San Mateo, *Herzog 1913* (BR, L, S, W), *Steinbach 8512* (GH, NY). Chuquisaca: Prov. Tomina, *Weddell 3784* (holotype of *Chaetogastra hermannioides* P; isotype F); near Padilla, *Carriker s.n.* (PH); without definite locality, *Weddell 3783* (P). Tarija: "Narvais" between Tarija and Chaco, *Fries 1283* (S, US); Tucumilla near Tarija, *Fiebrig 2458* (A, BR, G-DEL, GH, K, L, P, S, US, W). Without Department: *Bridges s.n.* (BR, G-BOIS, K) *Cuming s.n.* (W), *Lobb s.n.* (W), *Pearce 709* (K).

ARGENTINA: Jujuy: "Tirasi near Volcán, *Castillón 399* (LIL, NY), *Castillón 9378* (LIL, NY), *Castillón 9474* (LIL, NY); "Juan Gabán" near Léon, *Castillón 538* (LIL, NY); Yala, *Burkart & Troncoso 11264* (NY), *O'Donell 4880* (LIL).

There are no noticeable criteria for specific delimitation of the three epithets here involved. The "pentlandii" element would typically be represented by specimens with compact inflorescences, elliptic round-tipped leaf blades (15–35 × 8–16 mm.) with length/width ratio of 1.8–2.6 and with the upper surfaces sparsely strigulose (1–2/mm.^{2}), sparsely strigulose branchlets, and ovary apex lobes 2–4.5 mm. long: *Pentland s.n.*, *Nichols & Eggers s.n.*, *White 151*, *Cardenas 3214*, and *Bridges s.n.* Similar but with upper leaf surface pubescence 2–7/mm.^{2} and ovary apex lobes 1–1.5 mm. long are *Balls B6249 p.p.* (US p.p.), *Steinbach 8667*, *Herzog 1913*, and *Cuming s.n.* With similar leaf shape but denser and longer upper leaf surface pubescence (6–14/mm.^{2}) and very loosely appressed dense branchlet pubescence are *Werdermann 2015*, *Steinbach 8512*, and most of *Balls B6249*, although the last-named collection has great variation in pubescence density. *Balls B6277* ranges from sprigs similar to *Balls B6249* to some approaching the northern "hermannioides" element (but with contracted inflorescences); also similar to the northern "hermannioides" phase is *Steinbach 5948*. In part overlapping these last two collections to some extent is a "microdon" element with compact inflorescences, elliptic-lanceolate acute-tipped leaf blades with length/width ratio of 2–3.6 and with the upper surfaces moderately strigulose ((3–)5–8(–11)/mm.^{2}), generally very loosely appressed branchlet pubescence, and ovary apex lobes 1.5–2.5 mm. long. This group includes all other specimens from Depts. La Paz and Cochabamba, except *Cardenas 3056* which has a leaf blade length/width ratio of 2.6–3 but ovary apex lobes 3.7–3.9 mm. long. In all the foregoing groups, the pedicellar bracteoles are mostly caducous before anthesis and generally are linear to very narrowly spatulate (5–14 × 0.7–4 mm.); the pedicels are 2–7(–11) mm. long below the bracteoles. With leaf shape and size as in *Balls B-6277* p.p. and *Steinbach 5948* (ovate and acute-tipped, 20–40 × 10–20 mm.), but branchlet pubescence sparse and strictly appressed, the upper surfaces of the leaf blades sparsely short-strigose (1–3/mm.^{2}), the pedicels 10–20 mm. long below the bracteoles, and the persistent bracteoles 8–11 × 1.5–3.5 mm., is a northern "hermannioides" element: *Weddell 3783*, *Weddell 3784*, and *Carriker s.n.* The southern "hermannioides" element, consisting of *Fiebrig 2458*, *Fries 1283*, and all Argentinian specimens, is similar but shows larger leaves (30–85 × 20–40 mm.), variation in length of pedicels below bracteoles of 6–60 mm., and persistent bracteoles 10–41 × 2–11 mm. While the morphologic variation between the extremes is great, even varietal delimitation within *B. microdon* will be difficult and has been deferred.

No immediate relatives of *B. microdon* are apparent. The pubescence is somewhat suggestive of *B. ledifolium*. Perhaps a closer relative is *B. floribundum*, which differs in type of pubescence, development of inflorescence, and size of flowers.

20. **Brachyotum sanguinolentum** (Naudin) Triana, Trans. Linn. Soc. 28: 49. 1871.

Chaetogastra sanguinolenta Naudin, Ann. Sci. Nat. III. 14: 131. 1850.
Brachyotum floribundum (Grisebach) Triana, Trans. Linn. Soc. 28: 49. 1871. Nomen.
Brachyotum floribundum (Grisebach) Triana ex Cogniaux; DC. Monog. Phan. 7: 155. 1891.
Brachyotum barbiferum Rusby, Phytologia 1: 69. 1934.
Brachyotum pedicellatum Markgraf, Notizbl. Bot. Gart. Berlin 13: 460. 1937.

Trichomes smooth. Branchlets notably quadrangular, nearly glabrous to moderately short-strigose or the pubescence spreading. Petiole 2–18 mm. Blade 17–76 × 9–25 mm., elliptic with the apex acute to rounded-acute or obtuse and the base acute to obtuse, the 3 primaries (occasionally an additional pair of marginals varyingly developed) and 15–30 pairs of secondaries obscurely to noticeably (but narrowly) impressed above and finely elevated below, the secondaries usually reticulate; above glabrous or very sparsely strigulose to moderately short-strigose, the hairs to 7/mm.^{2} with their basal ¼–½ adherent; below nearly glabrous to moderately loose-short-strigose or hirsutulous, the hairs to 15/mm.^{2}, the glands usually solitary and 6–20/mm.^{2} but occasionally in clumps. Flowers constantly 4-merous, in terminal corymbiform usually ternate few- to many-flowered cymes, the cymes unbranched to twice-branched below the cymes, the ultimate pedicels solitary to ternately dichasial. Pedicel 0–10 × 0.4–0.5 mm. below the bracteoles, 3–

9 × 1–1.2 mm. above, often ebracteolate in the more crowded and floriferous cymes; peduncular bracts and pedicellar bracteoles very early caducous, grading in size from peduncular bracts 7 × 2 mm. or smaller to pedicellar bracteoles 0.7 × 0.15 mm., glabrous except for sparse short appressed marginal and abaxial-mid-vein hairs. Hypanthium 3.5–5 × 3–4 mm., 0.1–0.3 mm. thick medianly, nearly glabrous to very sparsely strigulose or loosely and sparsely short-strigose. Sepals 2–3.5 × 2.5–4 mm., broadly triangular and tipped with a short acumen, united at bases 0.8–1.5 mm., the sinuses obtuse. Petals deep purple, 10–15 × 6–11 mm., obovate with the apices broadly and asymmetrically obtuse, the cilia 0.1–0.3 mm. and non-glandular or with early-caducous glandular tips. Filaments 3–5.5 mm.; anthers 3–5 mm.; connective at anther base (0.6–)0.8–1.1 mm., free of the anther 0.3–0.4 mm., the ventral lobing 0.1–0.4 mm. Style 15–24 × 0.4–0.5 mm., exserted 4–7 mm. Ovary 4–5 × 2.5–3 mm., sparsely to moderately strigulose on the apical 1–2.5 mm., the apical lobes 0.5–1 mm. above the locules.

Type Collection and Locality: *Weddell 4605* (HOLOTYPE P); Bolivia, Dept. La Paz, "prov. de Larecaja et Caupolican (vallées entre Tipoani et Apolobamba) Mai 1847 . . . à 2500 mètres" (fide holotype).

Type Photographs: Gleason 51-3 (type no. of *B. floribundum*, in G-DC ?); F16709 (destroyed isotype of *B. floribundum* at B); New York s.n. (holotype of *B. barbiferum*).

Distribution: southeastern Peru to northeastern Bolivia, alt. 2300–3500 m.

PERU: Cuzco: "Lucumayo" in Prov. Convencion, *herb. Marin 1610* (US); near Huallahualla, *Vargas 9708 p.p.* (UC p.p., F). Puno: "Tabina" near Ayapata, *Lechler 1857* (possible holotype of *B. floribundum* G-BOIS; isotypes BR, K, P, S, W; fragments F); near Limbani, *Metcalf 30537* (G-DEL, NY, UC, US); Prov. Sandia, *Weberbauer 626* (G-DEL).

BOLIVIA: La Paz: between Ocara and Ancoma, *Tate 861* (NY); near Sorata, *Mandon 640* p.p., (BR p.p., F, G-DEL, G-BOIS, GH p.p., K, NY p.p., P, S, W p.p.); "Cocopunco" in the Cordillera Real, *Tate 331* (NY), *Tate 362* (holotype of *B. barbiferum* NY). Without Province: *Bang 2860* (BR, NY, US).

WITHOUT COUNTRY: "Huaycani," *Pearce s.n.* (BM, K).

Vernacular Names: Tili-tili (Vargas 9708).

Several sheets of *Lechler 1857* (G-BOIS, K, W) were annotated by Triana, but, of these, only the Geneva specimen had been annotated by Cogniaux also; the Gleason type photograph shows still another sheet annotated by both Triana and Cogniaux. The locality of the Pearce collection (Huaycani, or Huagcani ?, or Huagcaui ?, or Huaycaui ?) could be any of several localities in northeastern Bolivia with slightly different spellings. Other parts of *Mandon 640* include *B. grisebachii* and *Tibouchina latifolia* (Naud.) Britton; a portion of *Vargas 9708* is *B. grisebachii*.

All the cited collections are certainly conspecific. "Typical" *B. sanguinolentum* has young branchlets nearly glabrous except for the short nodal setae; petioles 2–5 mm.; blades 18–33 × 9–13 mm., above very sparsely strigulose (the hairs less than 1/mm.^{2}) to glabrous, below very sparsely strigulose along the primaries but nearly or quite glabrous on the secondaries and surface; and the hypanthium glabrous or nearly so, the hairs less than 1/mm.^{2} This element includes *Weddell 4605*, *Mandon 640 p.p.*, *Tate 861*, and *Bang 2860*; Markgraf's description of *B. pedicellatum* differs in no respect from these specimens. Aside from *Weberbauer 626* and *Pearce s.n.*, the remainder of the specimens cited under *B. sanguinolentum* have young branchlets sparsely to moderately strigulose or short-strigose; petioles 3–18 mm.; blades (17–)30–76 × (6–)15–25 mm., above sparsely strigulose to moderately short-strigose (2–7/mm.^{2}), below sparsely to moderately strigulose or loose-short-strigose along the primaries and sparsely strigulose on the surface (2–14/mm.^{2}); and the hypanthium sparsely strigulose (2–12/mm.^{2}). These specimens would correspond to *B. floribundum*, including *B. barbiferum*. *Pearce s.n.* has the large leaves of this latter group, the vegetative pubescence density of the "sanguinolentum" element, and hypanthial pubescence density of 2/mm.^{2} *Weberbauer 626* has the branchlet, peduncle, and pedicel pubescence spreading, the blade apices often rounded, and the lower leaf surface pubescence denser than in the "floribundum" element, but otherwise agrees in leaf size and pubescence density with that element. Such variation in degree of appression of pubescence has been noted in other species (*B. grisebachii*, *B. rostratum*) where intermediate degrees were fully represented, and does not seem worthy of formal recognition. Cogniaux's limited citations of dimensions suggest an inverse quantitative correlation between leaf and flower size, but such a relation does not exist. Successful infraspecific differentiation based on leaf size and pubescence density seems probable, but has been deferred.

The closest relative of *B. sanguinolentum* would appear to be *B. grisebachii*, which differs greatly in inflorescence development, calyx lobes, and petal shape. The only species with a similar degree of inflorescence development is *B. quinquenerve*.

21. **Brachyotum grisebachii** Cogniaux; DC. Monog. Phan. 7: 153. 1891.

Trichomes smooth. Branchlets quadrangular, very sparsely hirsute to strigulose, very soon glabrescent. Petiole 2–4(–7) mm. Blade 8–24 × 5–11 mm., ovate-lanceolate to lance-elliptic or elliptic to ovate with the apex acute or rounded-acute and the base obtuse to subtruncate, the 3 primaries impressed above and elevated below, the 7–12 pairs of secondaries narrowly to obscurely impressed above and obscurely elevated below, the margins *i. s.* usually strongly recurved; above glabrous (sparsely strigulose when young) or with some marginal hairs persisting or sparsely and permanently strigulose 1(–2)/1–2 mm.^{2}; below sparsely hirsutulous to sparsely strigulose 1–4/mm.^{2}, the glands in clusters often forming minute black punctae with age. Flowers constantly 4-merous, mostly crowded-ternate, sometimes with an additional pair at the node below the dichasial node, rarely solitary; dichasial peduncle erect, not differentiated from the branchlets, the internode below the dichasium 5–11 × 1.1–1.7 mm., the dichasium subtended by slightly reduced and persistent leaves. Pedicel 0.5–2 mm. below bracteoles, 2–6 mm. above; pedicellar bracteoles leaflike to noticeably modified, 2–10 × 1–2.5 mm., oblong to obovate, persistent or caducous before anthesis, above glabrous or apically very sparsely strigulose, below very sparsely strigulose. Hypanthium 4–7 × 3.5–5 mm., 0.3 mm. thick medianly, moderately strigulose with the thin hairs (4–)8–12/mm.^{2} Sepals (4.5–)6–10(–11.5) × (3.5–)4–4.5 mm., lanceolate with narrowly acute apices, united at bases 0.7–1.3 mm., the sinuses acute. Petals deep purple, 13–20 × 9–15 mm., obovate to elliptic and asymmetrical with the apices acute to narrowly obtuse, occasionally outside very sparsely strigulose basally, the marginal cilia 0.2–0.5 mm. (the terminal few to 1 mm.) and eglandular (very rarely with rather persistent glandular tips). Filaments 5–6.5 mm.; anthers 4–8 mm.; connective at anther base 1–1.5 mm., free of the anther 0.6–0.7 mm., the blunt ventral lobes (0.1–)0.4–0.7 mm. Style 17–26 × 0.4–0.5 mm., exserted 5–8 mm. Ovary 4.5–6 × 2.5–4 mm., moderately strigulose on the apical 1.5–3 mm., the apical lobes 0.6–0.7(–1.4) mm. above the locules.

Type Collection and Locality: *Lechler 1856* (LECTOTYPE collection BR, G-BOIS, K, P, S, W; fragment F); Peru, Dept. Puno, "prope Agapata."

Type Photographs: Gleason 51-2 (isolectotype, presumably in G-DC); F16711 (destroyed isolectotype at B).

Distribution: southeastern Peru to northwestern Bolivia, alt. 3000–3700 m.

PERU: Cuzco: Pinasniocc, *Cook & Gilbert 1861* (US); near Huallahualla, *Vargas 9708 p.p.* (G-DEL, UC p.p.); without definite locality, *Gay s.n.* (syntype P), *Weddell 4772* (syntype P). Apurimac: between Huancarama and Cochacaya, *West 3766* (GH, UC). Puno: "Prov. de Carabaya," *Raimondi 8939* (USM); near Limbani, *Metcalf 30492* (G-DEL, NY, UC, US).

BOLIVIA: La Paz: Igenio, *R. S. Williams 838* (NY); between Tararani and Yani, *Krukoff 11467* (NY); near Sorata, *Mandon 640 p.p.* (BR p.p., GH p.p., W p.p.); between Unduavi and Corvice, *Buchtien 4001* (GH, NY, US). Cochabamba: Yungas, *Pearce s.n.* (K). Without province: *Mandon 639* (NY).

Vernacular Names: Masuca *(Cook & Gilbert 1861)*; Macha *(West 3766)*; Aganto *(Raimondi 8939)*.

Lechler 1856 was designated by Macbride (1941, p. 268) as the type collection; of the several sheets of this collection annotated by Cogniaux (BR, G-BOIS, G-DC, P), the Boissier Herbarium specimen is perhaps the best and might be considered as *the* lectotype.

Vegetatively, the extremely glabrous forms of *B. grisebachii* are indistinguishable from the glabrous forms of *B. sanguinolentum* and also, to some extent, *B. cernuum*. *Cook & Gilbert 1861* has the foliage and persistent petal cilia glands of *B. naudinii*, but the inflorescence, sepals, and petal shape of the remainder of the specimens cited here. *B. grisebachii* is very closely related to *B. naudinii*, *B. huancavelicae*, and *B. nutans*; from the latter species, it may be differentiated by the longer sepals, larger leaves, somewhat differently shaped petals, and much more densely pubescent hypanthia.

22. Brachyotum huancavelicae Wurdack, sp. nov.

Trichomata gracilia laevia vel sparse muriculata. Ramuli novelli quadrangulati cum petiolis pedicellisque sparse strigulosi. Petiolus 4-7 mm. Lamina 15-30 × 6-10 mm. lanceolata apice acuta basi obtusa vel subtruncata, nervis primariis 3 supra impressis subtus expressis, secundariis supra invisis subtus leviter angusteque expressis et laxe reticulatis; supra sparse vel modice brevi-strigosa aut strigulosa, pilis 2-11/mm.^{2} basi ⅓-½ adhaerentibus; subtus sparse vel modice laxo-strigulosa 3-11/mm.^{2}, glandibus solitariis sparsis 5-20/mm.^{2} Flores fere semper 4-meri, in axillis oppositis confertis foliorum superiorum solitarii. Pedicellus 0.5-3 mm. sub bracteolis, 5-8 super; bracteolae 4-6 × 0.5-2 mm. spathulatae trinervatae persistentes vel caducae. Hypanthium 4.8-5.5 × 3.5-5 mm., medio 0.2-0.3 mm. crassum, cum sepalis sparse brevi-strigosum vel strigulosum, pilis tenuibus 5-10/mm.^{2} Sepala 5.5-10 × 4-5 mm. lanceolata apice anguste acuta basi per 0.8-1 mm. cohaerentia et leviter ampliata, sinu lato. Petala 15-23 × 12-16 mm. obovata et leviter asymmetrica apice obtusa, ciliis 0.1-0.4 mm. (paucis terminalibus ad 0.7-0.8 mm.) non-glandulosis aut glandulis valde caducis. Filamenta 3.5-7.5 mm.; antherae 3.5-7 mm.; connectivum basi antherae (0.8-)1.5-2 mm., ab anthera per (0.4-)0.7-0.9 mm. liberum, lobis ventralibus 0.1-0.7 mm. Stylus 25-33 × 0.4-0.5 mm., per 7-9 mm. exsertus. Ovarium 4.5-5.5 × 3 mm. apice per 2-2.5 mm. modice brevi-strigosum, lobis apicalibus super loculos 0.6-1.3 mm.

Type Collection and Locality: *Stork & Horton 10295* (HOLOTYPE F; isotypes G-DEL, UC); Peru, Dept. Huancavelica, Prov. Tayacaja, quebrada south of Salcabamba in shrubwood, sandy loam, 8 Jan. 1939. "Shrub 1-1.5 m.: corolla very dark violet: fr. immature."

Distribution: southern Dept. Junín to northern Dept. Huancavelica, Peru, alt. 3000-3300 m.

Junín: Hda. Runatullu near Comas, *Ochoa 725* (NY). Huancavelica: between Colcabamba and Paucarbamba, *Raimondi 10202* (USM).

It is with misgivings that another epithet is added to the complex of poorly defined species around *B. naudinii* and *B. grisebachii*. The flowers of *B. huan-*

cavelicae are often so crowded on the densely leafy branchlets that their solitary disposition is difficult to observe; yet in all specimens, terminal vegetative growth of the floriferous branches can be seen. The leaves on herbarium material show the same deeply impressed veins on the upper surfaces as found in *B. grisebachii* and *B. tyrianthinum.* From *B. tyrianthinum*, *B. huancavelicae* may be distinguished by the smooth or only very minutely and sparsely roughened hairs, the very narrowly acute calyx lobes which are somewhat expanded basally and glabrous within, and the non-glandular petal cilia. From *B. naudinii*, it differs in the generally larger leaves and sepal shape, as well as the non-glandular petals. *B. grisebachii* may be separated by the ternate flowers and generally less dense pubescence, as well as the more acute petals. *Vargas 319* (F), from Paucartambo in Dept. Cuzco, has the pubescence density of *B. huancavelicae*, but ternate flowers with the petals basally pubescent outside; Macbride (1941, p. 274) referred this specimen to *B. strigosum*, a quite different Colombian species; this imperfect collection is here doubtfully referred to *B. grisebachii.*

23. **Brachyotum nutans** Gleason, Bull. Torrey Club 54: 25. 1927.

Trichomes smooth. Branchlets quadrangular, very sparsely strigulose and soon glabrescent. Petiole 0.5-3.5 mm. Blade 5-12 × 3-6.5 mm., ovate to elliptic-ovate with the apex rounded and the base obtuse to subtruncate, the 3 primaries narrowly expressed above and elevated below, the secondaries obsolete; above glabrous; below very sparsely strigulose on the primaries, glabrous on the surface except for a few tufts of glands which turn black with age. Flowers constantly 4-merous, solitary on short lateral branchlets in opposite upper leaf axils, the branchlets with 1-2 pairs of leaves. Pedicel 2-5 mm. above the last slightly-reduced leaves (bracteoles ?). Hypanthium 3.5-4.5 × 3.5-4 mm., 0.2-0.3 mm. thick medianly, very sparsely strigulose (1/1-3 mm.^{2}) or glabrous except for a few apical hairs. Sepals 3.5-5.5 × 2.5-4.5 mm., triangular with acute apices, outside glabrous except for a very few appressed hairs basally, united at bases 0.5-1 mm., the sinuses acute. Petals deep purple, 15-18 × 11-14 mm., asymmetrically obovate with the apices bluntly obtuse, the gland-tipped cilia 0.1-0.2 mm. Filaments 3.5-5.5 mm.; anthers 4-5 mm.; connective at anther base 0.7-1.3 mm., free of the anther 0.4-0.7 mm., the ventral lobing 0.1-0.4 mm. Style 17-27 × 0.3-0.5 mm., exserted 6-11 mm. Ovary 4.5-5 × 2-3.5 mm., moderately to densely strigulose on the apical 1-2.5 mm., the apical lobes 0.3-0.6 mm.

Type Collection and Locality: *Pennell 13847* (HOLOTYPE NY; isotypes F, GH, PH, S, US); Peru, Dept. Cuzco, Paso de Tres Cruces.

Type Photograph: New York s.n. (holotype).

Distribution: Dept. Cuzco, Peru, alt. 2800-4000 m.

Pinasniocc, *Cook & Gilbert 1244* (US); Ollantaitambo, *Herrera 3342a* (US); "Acanacu" near Paucartambo, *Balls B6714* (NY), *Vargas 320* (F), *West 7034* (GH); Paucartambo, *Soukup 379* (F); Marcapata, *Stafford 990* (K).

B. nutans may be little more than a depauperate variation of *B. naudinii*, but the nearly glabrous leaves and hypanthia hold the cited specimens in a compact unit. The acute sepals are more like those of *B. grisebachii* which, however, has larger leaves, ternate flowers, much more densely pubescent hypanthia, and petals of a slightly different shape.

24. **Brachyotum naudinii** Triana, Trans. Linn. Soc. 28: 48. 1871.

Trichomes smooth to very minutely and sparsely roughened. Branchlets quadrangular, moderately to sparsely short-strigulose. Petiole 2-5 mm. Blade 5-17 × 4-7(-10) mm., ovate to elliptic with the apex rounded to blunt-acute and the base obtuse to subtruncate, the 3 primaries narrowly impressed above and elevated below, the secondaries obscure or obsolete above and below; above sparsely strigulose, the hairs 1–4/mm.^{2} with their basal $\frac{1}{3}$–$\frac{2}{3}$ adherent; below sparsely strigulose on the primaries, very sparsely on the surface 2–6(–10)/mm.^{2}, the glands to 25/mm.^{2} and solitary or in small clusters at hair bases. Flowers usually solitary on short lateral branchlets, usually exclusively 4-merous, occasionally predominantly 5-merous. Pedicel 2–5 mm. above the last somewhat reduced persistent leaves (bracteoles ?). Hypanthium 4–7 × 3.5–6 mm., 0.3–0.5 mm. thick medianly, sparsely to moderately strigulose, the fine hairs (6–)8–16/mm.^{2} Sepals (4–)5–7 (–9) × (3–)4–5 mm., oblong-ovate (rarely deltoid-ovate) with the apices rounded to broadly acute, united at bases 0.7–1.1 mm., the sinuses rounded-acute. Petals deep purple, 13–23 × 10–17 mm., asymmetrically or nearly symmetrically obovate with the apices broadly obtuse to rounded or truncate, the gland-tipped cilia 0.1–0.4(–0.6) mm. Filaments 3.5–7.5 mm., as long as the anthers; connective at anther base (0.6–)1–1.6 mm., free of the anther for $\frac{1}{2}$ the length or slightly less, the blunt ventral lobes 0.2–0.4(–0.8) mm. Style 17–25 × 0.4–0.6 mm., exserted 4–7 mm. Ovary 4.5–7 × 3–4 mm., sparsely to moderately strigulose on the apical (0.6–)1.5–3 mm., the apical lobes 0.3–1 mm. above the locules.

Type Collection and Locality: *Dombey s.n.* (HOLOTYPE presumably at P; isotypes BM, BR, F, G-DEL, L, P); "Peruvia," Dept. Huánuco (or more probably Junín), Palca, fide Macbride (1941, p. 271).

Type Photograph: F36134 (presumed holotype at P).

Distribution: central (to northern ?) to southeastern Peru, alt. 2700–4000 m.

Ancash: Baños de Chancos near Huaras, *Sandeman 4610* (K). Junín: east of Huancayo, *Stork & Horton 10218* (F, UC). Cuzco: Ollantaitambo, *Cook & Gilbert 720* (US); Yucay, *Soukup 736* (F, GH); Hda. Araypallpa near Paruro, *Vargas 389* (GH); "Valle de Apurimac," *Herrera s.n.* (F). Ayacucho: Quinua, *Weberbauer 5540* (F); "Totorobamba" in Prov. Huamanga, *Weberbauer 5484* (F, GH); "Pallcea" between "Pajanal" and Ayacucho, *Balls B6928* (GH, NY, UC, US); south of "Puchuhuillca" near "Mataral," *West 3662* (GH, UC). Apurímac: north of Chincheros, *Stork & Horton 10763* (F, UC); km. 58 between Abancay and Ayacucho, *Ferreyra 2795* (NY); "Quisvala" northeast of Abancay, *Balls B6894* (GH, NY, UC, US). Without Department: "Chile," *Gay s.n.* (F); "Lima," *Gay s.n.* (P); "Pacechac," *Hill 153* (K).

Vernacular Names: Masuca *(Cook & Gilbert 720)*; Ccehuincha *(West 3662)*; Jehuincha *(Stork & Horton 10763)*.

One Paris isotype is labeled only "herb. Richard"; this specimen was used by Cogniaux in drawing up his erroneous description of *B. microphyllum*; the isotype in Cogniaux's herbarium (BR) is a branch from this Paris sheet; while no collector was indicated on the Paris specimen, it is undoubtedly part of the Dombey type collection.

In the type collection, 17 of the 28 examinable flowers were 5-merous; in *Sandeman 4610*, 9 of 9; and in *Stork & Horton 10218*, 8 of 10. The remainder of the flowers in these collections and all of the 82 examinable flowers in all other cited specimens were 4-merous. The degree of pubescence roughening varied independently of the mery, the first two collections with predominantly 5-merous flowers being perceptibly roughened, and the third-mentioned smooth. The constantly 4-merous collections have pubescence scabridity between these extremes.

B. naudinii may be distinguished from *B. grisebachii* by the shape of the sepals and petals, the glandular petal cilia, and the solitary flowers. From *B. tyrianthinum*, it differs in the smaller leaves and shorter, sparser, less roughened trichomes, as well as the adaxially glabrous sepals. However, there are a series of constantly 4-merous specimens from northern Peru having pubescence development very suggestive of *B. tyrianthinum*, but the trichomes are smooth; the pubescence on the upper leaf surface ranges from 3-9/mm.^{2} and the sepals are rather variable in shape, ovate to ovate-oblong with variably acute apices, but glabrous within. They include *Stork & Horton 9962* (F, G-DEL, UC) from La Libertad, *Ferreyra 3291* (USM) and *Raimondi 3152* (USM) from Cajamarca, and *Mathews 1259* (K) and *Pennell 15530* (PH) from Amazonas. These specimens have been doubtfully referred to *B. naudinii. Sandeman 4291* (K) from Piura is even more anomalous, possibly being a depauperate form of the preceding group; the calyx lobes are very narrowly oblong-lanceolate and leaves narrowly elliptic.

25. Brachyotum tyrianthinum Macbride, Field Mus. Pub. Bot. 4: 174. 1929.

Trichomes moderately but minutely scabrid. Branchlets obscurely quadrangular, moderately to densely long-strigulose to strigose, tardily glabrescent. Petiole (1-)3-6 mm. Blade 10-30 × 6-14 mm., narrowly ovate to elliptic with the apex acute or blunt-acute and the base broadly acute to subtruncate, the 3 primaries narrowly impressed above and elevated below, the 8-12 pairs of secondaries mostly invisible above and lightly elevated below; above moderately short-strigose, the hairs (3-)5-7(-10)/mm.^{2} with their basal ¼-½ adherent and not abruptly expanded; below densely long-strigulose on the primaries, moderately to sparsely hirsutulous or loose-strigulose on the surface (3-)7-11/mm.^{2}, the glands mostly solitary 12-30/mm.^{2} Flowers 4-5-merous, the 4-merous ones usually predominant, solitary on short lateral leafy branchlets in opposite upper leaf axils. Pedicel 2-5 mm. above the last somewhat reduced (3-10 × 1-4 mm.) persistent leaves (bracteoles ?). Hypanthium 4.5-6 × 4-5 mm., 0.3-0.5 mm. thick medianly, sparsely to moderately strigose, the fine hairs 8-11/mm.^{2} and to 1.5-3.5 × 0.2-0.3 mm. Sepals 6.5-9 × 3-4.5 mm., oblong-ovate to lanceolate with the apices acute, inside sparsely strigulose on the apical ⅕-½. Petals deep purple, 12-17 × 9-14 mm., obovate and sometimes slightly asymmetrical with the apices very broadly obtuse, the gland-tipped cilia 0.1-0.2 mm. (the terminal few to 0.4-0.8 mm.). Filaments 4-5 mm.; anthers 4.5-6.5 mm.; connective at anther base 1-1.7 mm., free of the anther 0.3-0.7 mm., the ventral lobing 0.1-0.2 mm. Style 18-21 × 0.4-0.7 mm., exserted 5-6 mm. Ovary 6.5-7 × 3.4-4 mm., sparsely to moderately long-strigulose on the apical 2-3.5 mm., the apical lobes 0.7-1 mm. above the locules.

Type Collection and Locality: *Macbride & Featherstone 1438* (HOLOTYPE F; isotypes G-DEL, S, US); Peru, Dept. Huánuco, Mito, alt. 2750 m.

Type Photograph: F63425 (holotype).

Distribution: central to northern Peru, alt. 2750-4000 m.

Cajamarca: between Cajamarca and Celendín, *Scolnik 1323* (NY). Huánuco: Chaglla, *Sandeman 5109* (K); Mito, *Macbride & Featherstone 2092* (F, NY); probably near Cerro de Pasco, *Sawada P89* (F). Without Locality: "Columbia," *Lobb s.n.* (K).

Vernacular Names: Cachis *(Macbride & Featherstone 1438)*.

All of the 17 examinable flowers in the type collection were 4-merous, as were all 15 in *Scolnik 1323*; 1 of 10 flowers in *Sandeman 5109*, 2 of 6 in *Lobb s.n.*, 9 of 15 in *Macbride & Featherstone 2092*, and 5 of 5 in *Sawada P89* were 5-merous. Aside from mery, the species is quite uniform morphologically, although an occasional flower has the sepals glabrous within.

Aside from its immediate relatives, *B. tyrianthinum* may be related to *B. rosmarinifolium*, the roughened pubescence being a possible indication of such a linkage. It is also somewhat reminiscent of *B. strigosum*, which however has smooth hairs, differently shaped sepals, much stouter hypanthial pubescence, larger and more deeply divided connective prolongation, and smaller apical ovary lobes.

26. **Brachyotum cernuum** (Bonpl.) Triana, Trans. Linn. Soc. 28: 48. 1871.

Rhexia cernua Bonpl. Rhexies 32. 1806–1808.
Osbekia cernua (Bonpl.) Sprengel, Syst. Veg. ed. 16. 2: 312. 1825.
Chaetogastra cernua (Bonpl.) DC. Prodr. 3: 135. 1828.

Trichomes smooth, slender. Branchlets notably quadrangular, very sparsely strigulose, soon glabrescent except on the angles, the nodes conspicuously annular-setose, these hairs to 5 mm. long. Petiole 3–6 mm. Blade 18–30 × 8–15 mm., ovate with the apex bluntly acute and the base broadly obtuse to truncate, the 3 primaries impressed above and strongly elevated below, with an additional faintly developed pair of marginals, the secondaries forming a prominent reticulum which is obscurely impressed above and narrowly elevated below; above glabrous; below sparsely short-strigose on the primaries, with only a few scattered hairs and a few scattered inconspicuous clumps of glands on the surface. Flowers constantly 5-merous, ternate or with an additional pair at the node below the dichasial node, the dichasium compact and its peduncle not differentiated nor pendent, the persistent leaves subtending the dichasium only slightly reduced. Pedicel 1–7 mm. below the bracts, 2–4 mm. above; pedicellar bracts persistent, 6–8 × 1–2 mm., or those subtending the center flower of the dichasium leaflike. Hypanthium 4–5 × 4 mm., 0.2 mm. thick medianly, glabrous to very sparsely strigulose, the hairs fewer than $2/\text{mm.}^2$ Sepals 9–13 × 2.5–4 mm., lanceolate with narrowly acute apices, glabrous except for the marginal appressed cilia and a few appressed hairs abaxially along the midveins, united at bases about 1 mm., the sinuses acute. Petals deep purple, 13–18 × 10–15 mm., rhomboidal-obovate and symmetrical with the apices narrowly obtuse, the non-glandular cilia 0.2–0.8 mm. Filaments 4.5–6 mm.; anthers 4–5 mm.; connective at anther base 1.3–1.7 mm., free of the anther 0.7–0.9 mm., the ventral lobing 0.7–1 mm. Style 19–26 × 0.7–0.8 mm., exserted 7–10 mm. Ovary 4–4.5 × 3.5–4 mm., moderately long-strigulose on the apical 1–2 mm., the apical lobes 0.2–0.3 mm. above the locules.

Type Collection and Locality: *Bonpland s.n.* (HOLOTYPE presumably in Herb. Humboldt & Bonpland at P; isotypes F, P); Colombia, Dept. Cauca, "(Monte de Purase), juxta urbem Popayan . . . plus de 2000 mètres."

Type Photographs and Illustrations: F36137 (presumed holotype); Rhexies *pl. 13* (1806–1808) (as *Rhexia cernua*). Triana's illustration (Trans. Linn. Soc. 28: *pl. 3, f. 33b.* 1871) is probably not this species, since the flower shown there is 4-merous and with a quite pubescent hypanthium.

Distribution: southern Colombia, alt. 2000–3200 m.

Cauca: between Chapa and Río Blanco, *Core 907* (NA, NY). Nariño: Tuquerres and Almaguer, *Triana s.n.* (BR, K, NY, P, US, W); Volcán de El Galeras, *Ewan 16332* (NY). Without Department: *Hartweg 1003 p.p.* (P, S, W).

Hartweg 1003, from the various labels seen, was collected in various localities, Pichincha, Pasto, and Popayan being cited on the diverse specimens; the specimens cited for *B. cernuum* are probably from one of the latter two locations.

All of the 42 examinable flowers in the various collections were 5-merous. This species is strikingly like the Bolivian specimens of *B. grisebachii*, being distinguishable only by the much sparser hypanthial pubescence, 5-merous flowers, more symmetrical petals, much less dense abaxial leaf surface pubescence, and shorter apical ovary lobes. However, the closest relative of *B. cernuum* seems to be *B. lindenii*, which differs in the drooping dichasial peduncles, early-caducous pedicellar bracteoles, rounded to broadly obtuse petals, inconspicuously developed nodal setae, usually smaller leaves, and denser hypanthial pubescence.

Ewan noted on his collection of *B. cernuum* that it appeared to be a lower-altitude relative of his collection of *B. lindenii (Ewan 16330)*. The logical morphologic intermediate between these two relatives should be through such glabrous large-leaved specimens of *B. lindenii* as *Hartweg 1003* p.p.; however no such intermediates have been seen. *Cuatrecasas 20039*, from Páramo de Bavaya in Dept. Valle in Colombia (F, NY), is, however, intermediate between the two species to some extent, having the leaf and hypanthial pubescence as well as the inflorescences and inconspicuous nodal setae of "typical" *B. lindenii* and the larger sepals (10–10.5 × 3.5–4 mm.) and more pointed petals of *B. cernuum*; it is perhaps best regarded as an exceptionally robust specimen of *B. lindenii*.

27. **Brachyotum lindenii** Cogniaux; DC. Monog. Phan. 7: 159. 1891.

Brachyotum riveti Danguy & Chermezon, Bull. Mus. Hist. Nat. [Paris] 28: 433. 1922.
Brachyotum strigosum var. *tolimensis* Cuatrecasas, Trab. Mus. Nac. Ci. Nat. Madrid 33: 89. 1936.

Trichomes smooth, slender. Branchlets quadrangular, sparsely to moderately strigulose, soon glabrescent. Petiole 1–5 mm. Blade 9–22 × 4–9 mm., narrowly ovate with the apex acute to blunt-acute and the base obtuse to subtruncate, the 3 primaries narrowly impressed above and elevated below, the 6–12 pairs of secondaries obscurely impressed or invisible above and very lightly elevated below; above glabrous to sparsely strigulose, the hairs to 5–6/mm.^{2} and with the basal ⅓–½ adherent; below sparsely strigulose on the primaries, the surface glabrous to sparsely loose-strigulose, the hairs to 8/mm.^{2}, a cluster of glands at the base of each hair turning black with age. Flowers predominantly 5-merous, sometimes ternate but mostly with an additional pair at the node below the dichasial node, occasionally the dichasia ternate. Peduncle, at anthesis of the terminal dichasium, with the internode below the dichasium 6–15 × 0.5–1 mm. and strongly pendant; bracts at base of dichasium 3.5–7 × 1–3 mm., spatulate to leaf-like, in the 5-flowered inflorescences early caducous. Pedicel 3–10 mm. below bracteoles, 1–3 mm. above; pedicellar bracteoles 1–6 × 0.3–1 mm., linear to narrowly spatulate, very early caducous, above glabrous, below very sparsely strigulose. Hypanthium 4–6 × 3–5 mm., 0.3–0.5 mm. thick medianly, sparsely to moderately strigulose, the hairs (2–)5–10(–20)/mm.^{2} Sepals 4–8.5 × 2.5–4.5 mm., lanceolate with acute apices, united at bases 0.6–1.1 mm., the sinuses acute. Petals deep purple, 10–16 × 8–13 mm., obovate and slightly asymmetrical with the apices broadly obtuse to rounded, the non-glandular cilia 0.1–0.5 mm. (the terminal few 0.4–1 mm.). Filaments 4–6 mm.; anthers 4–6 mm.; connective at anther base (0.7–)1–1.7 mm., free of the anther 0.5–0.8 mm., the ventral lobing 0.3–0.7 mm. Style 15–22 × 0.5–0.7 mm., exserted 3–8 mm. Ovary 4.5–5.5 × 2.5–4 mm., sparsely to moderately strigulose on the apical 1.5–2.5 mm. with the hairs usually conic, the apical lobes 0.3–0.7 mm. above the locules.

Type Collection and Locality: *Linden 925* (LECTOTYPE G-DEL; isolectotypes BR, K, P, W; fragments F); Colombia, Dept. Tolima, "prov. Mariquita ad Tolima," "hauteur 2000 toises."

Type Photographs: F16712 (destroyed syntype at B, collected by Stübel); F36922 (syntype of *B. riveti* at P, *Rivet 342*).

Distribution: north central Colombia to northern Ecuador, elev. 3000–4200 m.

COLOMBIA: Antioquia: Páramo Morro Frontino north of Urrao, *Core 377* (NA, NY). Caldas: Manizales, *Sandeman 5709* (K); Páramo del Quindio, *Pennell & Hazen 9990* (GH, NY, PH, US), *Triana s.n.* (isosyntypes of *B. riveti* K, P, US, W). Cundinamarca: Bogotá, *Triana s.n.* (K, NY, P, W). Tolima: Nevada del Tolima, *Cuatrecasas 2834* (isosyntype of *B. strigosum* var. *tolimensis* K). Cauca: Volcán del Puracé, *Cuatrecasas 14700* (F, NY), *Pennell & Killip 6567* (GH, NY, PH, US), *von Sneidern 1833* (S), *von Sneidern 1834* (S). Nariño: between Buesaco and Pasto, *André 817* (K); Volcán El Galeras, *Ewan 16330* (NY), *Schultes & Villarreal 7952* (NY); Pasto, *Hartweg 1003 p.p.* (BR, G-BOIS, G-DEL, K), *André 1075* (K); Yacuanquer, *de Garganta 476* (F); Páramo del Angel, *Sandeman 110* (K).

ECUADOR: Carchi: Páramo del Angel, *Acosta 10546* (F), *Asplund 10393* (S); "La Rinconada" between Ibarra and Tulcán, *Hitchcock 20792* (GH, NY, US); Nudo de Boliche, *Penland & Summers 866* (F, NY); San Gabriel, *Holmgren 7492* (S); between "Moran and Olivos," *Mexia 7492* (F, NY, UC, US). Imbabura: between Ibarra and Mariano Acosta, *Drew E-289* (NA, NY). Pichincha: Mojanda, *Sodiro 467* (BR); between Pedregal and "Hda. Yanurcu," *Acosta 8299* (F).

In the packet of *Sodiro 467* (BR) is *B. alpinum*, doubtfully from the same collection; this sprig may be part of *Sodiro 466*.

As has been noted in other species, the density of foliar pubescence is usually of no specific reliability, and in the case of *B. lindenii* and *B. riveti*, also of no varietal significance. All intergradations between *B. lindenii*, with leaves sparsely strigulose above and sparsely loose-strigulose below on the surface (*Triana s.n.* Bogota, *Linden 925*, *André 817*, *Core 377*, *André 1075*, *Ewan 16330*), and *B. riveti*, with leaves glabrous above and very sparsely strigulose only on the primaries below (*Sandeman 111*, *Mexia 7492*, *Hitchcock 20792*, *Acosta 10546*, *Penland & Summers 866*, *de Gargantua 476*, *Schultes & Villarreal 7952*, *Sodiro 467*, *Drew E-289*, *Asplund 10393*, *Holmgren 878*), can be found, even within some of the collections cited above. Of the 156 observable flowers among all the collections, only 15 were 4-merous (2 of 24 in *Pennell & Hazen* 9990, 7 of 23 in *Pennell & Killip* 6567, 1 of 6 in *Schultes & Villarreal* 7952, 1 of 9 in *Sandeman 110*, 1 of 3 in *Acosta 10546*, 2 of 8 in *Hitchcock 20792*, and 1 of 11 in *Penland & Summers 866*).

28. Brachyotum alpinum Cogniaux; DC. Monog. Phan. 7: 167. 1891.

Trichomes smooth, slender. Branchlets quadrangular, sparsely strigulose, soon glabrescent. Petiole 1–4 mm. Blade (6–)10–17× 4–9 mm., the shape and venation as in *B. lindenii*; above glabrous to very sparsely strigulose, the hairs to 1–2/mm.^{2} and with their basal $\frac{1}{3}$ adherent; below sparsely strigulose on the primaries, the surface glabrous to sparsely loose-strigulose, the hairs to 7/mm.^{2}, the glands as in *B. lindenii*. Flowers constantly 4-merous, the inflorescences as in *B. lindenii*. Hypanthium 4–7 × 4–5 mm., 0.3–0.4 mm. thick medianly, sparsely strigulose, the hairs 4–8/mm.^{2} Sepals 3.5–8 × 3–4 mm., lanceolate to oblong-lanceolate with acute apices, united at bases 0.5–1.2 mm., the sinuses acute to rounded-acute. Petals deep purple, 10–14 × 8–11 mm., asymmetrically obovate with the apices rounded to broadly obtuse, the eglandular cilia 0.1–0.6 mm. Filaments 4–4.5 mm.; anthers 4.5–6.5 mm.; connective at anther base 1–1.5 mm., free of the anther 0.4–0.8 mm., the ventral lobing 0.3–0.6 mm. Style 17–22 × 0.4–0.6 mm., exserted 3–6 mm. Ovary 4–5.5 × 2.5–3.5 mm., moderately strigulose on the apical 1.5–2.5 mm., the apical lobes 0.3–1 mm. above the locules.

Type Collection and Locality: *Jameson s.n.* (or *193* ?) (SYNTYPES presumably in G-DC and LE; isosyntypes BR, F, G-BOIS, G-DEL, K, US, W) and *Fraser s.n.* (SYNTYPE presumably in G-DC); Ecuador, Prov. Chimborazo, "mont. Chimborazo altit. 4000 m.," and "Ecuador," respectively.

Type Photographs: Gleason 51-5 (Jameson and Fraser syntypes presumably in G-DC); F25862 (Fraser syntype presumably in G-DC).

Distribution: north central Ecuador, alt. 3200–4000 m.

Pichincha: "Quitensian Andes," *Couthouy s.n.* (GH, NY). Bolívar: "Gualicon Loma," *Acosta 6278* (F). Tungurahua: "Páramo of Minza," *Penland & Summers 325* (F, NY). Chimborazo: Chimborazo, *Sodiro 466* (BR); "Chimborazo and Cayambe," *Hall 3* (K); Cerro Altar, *Heinrichs 877* (G-DEL, NY); near Riobamba, *Rimbach 137* (NY, US); between Huamboya and Pungalá, *Scolnik 1542* (NY); "Sinche" (Sinchán ?), *Tate 461* (US); trail to "El Placer," *Acosta 7231* (F). Without Province: "Eastern Cordillera," *Rimbach 21* (F, GH); "Guyaquil," *herb. Ruiz & Pavón s.n.* (F).

No lectotype was selected since material was not seen of either of the syntypes which had been annotated by Cogniaux (except the specimen in the Cogniaux herbarium). Some of the Jameson sheets are unnumbered and some are numbered *193*; also, without correlation, some have complete data on the place of collection (Chimborazo) and some are merely labeled "Quito"; these specimens are apparently all parts of one collection and have been so cited.

B. alpinum is very closely related to *B. lindenii*, and can be differentiated from that species only by the 4- rather than 5-merous flowers; all except 1 of the 73 examinable flowers among the various collections ascribed here to *B. alpinum* were 4-merous. A part of the collections (*Rimbach 21* p.p., *Rimbach 137* p.p., *Penland & Summers 325*, *Acosta 7231*, *Scolnik 1542*) have leaves above and below glabrous except along the primaries on the lower surfaces, thus duplicating the more glabrous specimens of *B. lindenii.* The future disposition of *B. alpinum* will probably be as a subspecies of *B. lindenii. B. alpinum* may be differentiated from *B. grisebachii* by a combination of rather insignificant characters which, however, give the Ecuadorian species quite a different aspect; drooping (rather than erect) more slender terminal peduncular internodes, predominantly 5-flowered inflorescences, pedicels longer below than above the pedicellar bracteoles, and much less acute petals. The smaller leaves, denser hypanthial pubescence, less-developed inflorescences, and quite different sepals separate *B. alpinum* from the small-leaved and glabrous element of *B. sanguinolentum.*

29. Brachyotum strigosum (L. f.) Triana, Trans. Linn. Soc. 28: 49. 1871.

Melastoma strigosa Linn. f. Suppl. Plant. 236. 1781.
Rhexia stricta Bonpl. Rhexies 19. 1806–1808.
Chaetogastra stricta (Bonpl.) DC. Prodr. 3: 134. 1828.
Alifana striata [misspelling of *stricta*] (Bonpl.) Raf. Syl. Tell. 101. 1838.
Chaetogastra goudotii Naudin, Ann. Sci. Nat. III. 14: 131. 1850.
?*Brachyotum strictum* Triana, Trans. Linn. Soc. 28: 166. 1871. Nomen.

Trichomes smooth. Branchlets rounded-quadrangular, densely and persistently strigose. Petiole 1–4 mm. Blade (7–)11–16(–20) × (2.5–)4–8(–10) mm., lanceolate to ovate with the apex acute to narrowly obtuse and the base obtuse, the 3 primaries (occasionally an additional pair of indistinct marginals) deeply and finely impressed above and elevated below, the secondaries obscure or invisible above and obscurely elevated below; above moderately strigulose to short-strigose, the fine hairs (2–)3–5(–8)/mm.^{2} with their basal ⅓–⅔ adherent and not expanded; below moderately to densely short-strigose on the primaries, sparsely strigulose on the surface (3–)5–7(–9)/mm.^{2}, with clusters of glands subtending the surface hairs and also sparsely on the surface. Flowers predominantly 5-merous, mostly solitary on short branchlets in opposite upper leaf axils, in very floriferous branches sometimes ternate with no differentiated peduncle. Pedicel 2–5 mm. long above the last persistent slightly-reduced leaves (bracteoles ?). Hypanthium 4.5–6 × 4–5.5 mm., 0.3–0.4 mm. thick medianly, densely strigose, the stout hairs 4–8/mm.^{2} and to 2–5 × 0.2–0.5 mm. Sepals (4.5–)6–10 × (3–)4.5–7.5 mm., broadly ovate with acute apices, barely (0.4–0.7 mm.) united at bases, generally imbricate medianly 0.5–1.5 mm. Petals deep purple, 13–17 × 10–15 mm., symmetrically or slightly asymmetrically obovate with the apex rounded to rounded-truncate, the gland-tipped cilia 0.1–0.5 mm. (the several subterminal 0.4–1 mm., the terminal one 0.8–1.7 mm.). Filaments 4–6 mm.; anthers 3–5 mm.; connective at anther base (0.8–)1.2–2.2 mm., free of the anther (0.6–)0.8–1.5 mm., the ventral lobes (0.4–) 0.8–1.5 mm. long, each lobe often as much as 0.7 mm. wide and often irregularly lobulate at its free end. Style (16–)20–25 × 0.5–0.7 mm., exserted 4–8 mm. Ovary 4.5–7 × 3–4.5 mm., moderately strigulose to strigose on the apical (1–)2–3 mm., the apical lobes 0.3–0.7(–0.9) mm. above the locules.

Type Collection and Locality: *Mutis s.n.* (HOLOTYPE presumably at LINN); "Nova Granada," probably in the vicinity of Bogotá, Dept. Cundinamarca, Colombia.

Type Photographs and Illustrations: Savage Catalogue 559.6 and 559.7 (photographs at A, of 2 sheets of type collection in LINN); Rhexies *pl. 8* (1806–1808) (as *Rhexia stricta*); Trans. Linn. Soc. 28: *pl. 3*, *f. 33a* (as *Brachyotum strictum*). The reference, in the original description of *Melastoma strigosa*, to Marcgrav's "Caaghiyvyo" is not correct; Marcgrav's illustration shows a Melastome with an inferior ovary, and the accompanying description cites "baccae nigrae" as well as "nascitur pluribus locis in Brasilia nostra."

Distribution: Dept. Cundinamarca (and doubtfully Dept. Cauca), Colombia, alt. 2600–3300 m.

Cundinamarca: between Chiquinquirá and Zipaquirá, *Linden 777* (BR, F, G-BOIS, G-DEL, K, P, US, W); Zipaquirá, *Pérez & Romero 1303* (F); between Zipaquirá and Pacho, *Cuatrecasas 9523* (NY), *Gutierrez 106* (GH); Páramo de Guasca, *Garcia-Barriga 11683* (COL), *Schultes & Jaramillo 3179* (US); Cerro de Suba, *Duque 2759-A* (COL); above "El Chico" just north of Bogotá, *Fosberg 22025* (NA, NY); Páramo de La Calera, *Philipson & Idrobo & Fernandez 2463* (BM); Usaquén, *Cuatrecasas 9422* (US); between La Calera and Bogotá, *Barkley & Garcia-Barriga & Vanegas 17C804* (COL), *Woronow & Juzepczuk 5099* (NY); near Bogotá, *André 1084* (BR, K), *André 1261* (K, NY), *Aristé-Joseph A292* (US), *Goudot s.n.* (holotype of *Chaetogastra goudotii* P), *Holton 912* (G-BOIS, GH, K, NY), *Karsten s.n.* (W), *Rusby & Pennell 1287* (GH, NY, US), *Sandeman 5959* (K), *Triana s.n.* (BR, K, NY, P, W); "Sta. Fé," *Bonpland s.n.* (P); "Guadalupe" near Bogotá, *Haught 5009* (US), *Haught 5635* (US), *Haught 5694* (NY, US), *Niemeyer 217* (NY, US); "Páramo de Cruz Verde," *Cuatrecasas 432* (F, US); "Cerro de Focha" near Bogotá, *Pennell 2207* (NY); "Monserrate" between Bogotá and Chipaque, *Cuatrecasas 38* (F, US), *Dawe 18* (K, US), *Garcia-Barriga 11940* (US), *Niemeyer 119* (US), *Pérez 1020* (COL); Páramo de Chipaque, *Schultes 4067* (US); Sumapáz, *Lehmann 2402* (G-BOIS). Without Department: "Purase," *Bonpland s.n.* (isotype of *Rhexia stricta* P); *Purdie s.n.* (K); *Rodriguez 14* (G-DEL).

Vernacular Names: Quechinol ? *(Niemeyer 119)*; Zarcillo or Almorrana *(Duque 2759-A)*.

While Bonpland cited "Purase" (Dept. Cauca) as the type locality for *Rhexia stricta*, it is doubtful if this citation is correct; two Bonpland specimens examined are labeled "Sta. Fé" and another "Purase." There probably was an error in Bonpland's field notes, as no recent collections from this much-visited area in southern Colombia have been seen.

In addition to the specimens cited above, there is one sheet of the Ventenat herbarium (G-DEL) with 3 sprigs and several labels indicating "Santa Fé de Bogotá" as the place of collection, but with no collector indicated. One label of this sheet was annotated by Bonpland in 1809, after the publication of *Rhexia stricta*, apparently while he was in charge of the gardens at Malmaison. Ventenat had carefully drawn up a description of the plant as a new species of "*Meriana*"; the collection probably predates the Bonpland collections and may be a Mutis specimen.

All except one of the 20 examinable flowers on the holotype of *Chaetogastra goudotii* are 5-merous; even the one in one packet on the sheet, apparently the flower used by Naudin for his diagnosis, is 5-merous. In another packet on the same sheet are a large number of the 4-merous fruits of *Castratella piloselloides* (Bonpl.) Naudin, which apparently had become separated from another Goudot collection; Naudin may well have been misled by these fruits, since the twisting and imbrication of the sepals in *B. strigosum* make mery observations difficult. Among all the collections of *B. strigosum*, 182 of the 200 observable flowers were 5-merous, and only 18 4-merous; in each collection, 5-mery was dominant.

B. strigosum is probably most closely related to *B. jamesonii*; fruiting specimens of the latter species, with the floral bracts having dropped, can be distinguished from *B. strigosum* by the much finer hypanthial pubescence and 4-sepaled fruits. The more pubescent forms of *B. lindenii* are distinguishable by the different inflorescences, sepals, and petals.

30. **Brachyotum jamesonii** Triana, Trans. Linn. Soc. 28: 49. 1871.

Trichomes smooth, slender. Branchlets obscurely quadrangular, sparsely to moderately strigulose. Petiole 2-6 mm. Blade 6-12(-16) × 3-6 mm., lanceolate-elliptic to ovate with the apex bluntly acute and the base broadly acute to obtuse, the 3 primaries impressed above and elevated below, the secondaries more or less obsolete; above sparsely strigulose, the hairs (2-)4-7(-9)/mm.^{2} with their basal ¼-½ adherent; below sparsely loose-strigulose to hirsutulous, the surface hairs 6-9/mm.^{2} and each subtended by a cluster of glands. Flowers constantly 4-merous, ternate on short lateral or terminal branches with each flower closely invested by 2 persistent bracts and the dichasium invested by 2 similar bracts which are inserted at the base of the dichasium, or less frequently solitary and invested by 4 bracts; peduncle 3-15 mm. above the last leaves and 1-2 mm. diam., cernuous. Bracts elliptic to ovate with the apices acute to rounded, 5-9-nerved, outside centrally moderately strigulose but marginally nearly or quite glabrous; peduncular bracts (in ternate inflorescences) 9-18 × 4.5-7 mm.; pedicellar bracts 6-9.5 × (3.5-)5-7.5 mm., the pedicel 2-4 mm. long below them, 0-1 mm. above. Hypanthium 5-8.5 × 4-5 mm., 0.2 mm. thick medianly, moderately to densely strigose, the hairs 5-12/mm.^{2} and to 2.5-3.5 mm. long. Sepals 3.5-6.5 × 3-6 mm., ovate to oblong-ovate with the apices broadly acute to obtuse, united at bases 0.2-0.4 mm. and sometimes slightly imbricate. Petals deep purple, 14-16 × 11-15 mm., obovate and slightly asymmetrical with the apices obtuse to rounded, the gland-tipped cilia 0.1-0.3 mm. Filaments 2.5-5 mm.; anthers 3-6.5 mm.; connective at anther base 0.8-1.5 mm., free of the anther 0.3-0.8 mm., the ventral lobing 0.2-0.4 mm. Style 17-28 × 0.4-0.6 mm., exserted 4-10 mm. Ovary 5-6.5 × 2.5-3.5 mm., moderately short-strigulose on the apical 2-3.5 mm., the apical lobes 0.7-1.4 mm. above the locules.

Type Collection and Locality: *Spruce 6031* (HOLOTYPE K; isotypes BR, G-BOIS, G-DEL, GH, NY, P, W); Ecuador, southeastern Prov. Chimborazo near Prov. Cañar border, "in m. Azuay, loco Runa-rupashca, 12,000 p. Aug. 1859" (fide holotype).

Type Photographs: Gleason 87-1 (isotype at K); F25863 (isotype at G-DC).

Distribution: central Ecuador, alt. 3000-4000 m.

Chimborazo: Pangor and "Huangopud," *Lehmann 5794* (F, GH, K, S, US). Cañar: near Cañar, *Rose & Rose 22765* (GH, NY, US); Cerro Buerán, *Fosberg & Giler 22648* (NA, NY); Pillzhum, *Jameson 22* (GH). Azuay: "Toreador" between Molleturo and Quinoa, *Steyermark 53193* (F, NY); along Río Matadero west of Cuenca, *Camp E-1998A* (NY), *Camp E-1998B* (NY); Páramo de Tinajillas, *Camp E-2278* (NY); near Nabón, *Rose & Pachano & Rose 23003* (US). Without locality: "Perou," *Bonpland s.n.* (P).

The number of the type collection was misprinted as "6081" in the original publication.

B. jamesonii may be distinguished from its near relative, *B. confertum*, by its constantly 4-merous flowers, usually broadly acute-tipped innermost pair of floral bracts, less densely pubescent hypanthium, with the hairs whitish rather than tawny to yellowish, more acute sepals, and non-glandular ovary hairs. Some flowers in *Lehmann 5794* have early-caducous glandular tips on the hypanthial hairs.

31. **Brachyotum confertum** (Bonpl.) Triana, Trans. Linn. Soc. 28: 49. 1871.

Rhexia conferta Bonpl. Rhexies 53. 1808.
Chaetogastra conferta (Bonpl.) DC. Prodr. 3: 135. 1828.

Bolina conferta (Bonpl.) Raf. Syl. Tell. 101. 1838.
Brachyotum campylanthum Triana, Trans. Linn. Soc. 28: 49. 1871.

Trichomes smooth. Branchlets obscurely quadrangular, densely tawny- or yellowish-strigulose. Petiole 1-3 mm. Blade 4-12(-16) × 2.5-6 mm., ovate (sometimes with the margins so strongly recurved as to appear oblong) with the apex rounded-acute and the base broadly acute to obtuse, the 3 primaries impressed above and elevated below, the secondaries obscure or obsolete; above moderately strigulose, the slender hairs 10-15/mm.^{2} and with their basal ⅓-½ adherent; below densely loose-long-strigulose on the primaries, the surface moderately hirsutulous with the hairs 15-25/mm.^{2} and less than 1 mm. long, the solitary glands 15-40/mm.^{2} Flowers predominantly 5-merous, predominantly solitary on short leafy lateral branchlets, closely invested by usually 4 (occasionally 6, rarely 2) persistent bracts, the last branchlet leaves modified toward bracts to varying degrees; pedicel 0-10 mm. above the last branchlet leaves. Outer bracts of 6-bracteate flowers 4.5-9 × 5-7 mm., broadly ovate to orbicular with the apices broadly acute to rounded; innermost 2 pairs of bracts 6-11 × 6-12 mm., orbicular to ovate-orbicular with the apices rounded, outside densely sericeous-strigose with the tawny to yellowish hairs 15-20/mm.^{2} and to 3 mm. long. Hypanthium 5-8 × 5-8 mm., 0.2-0.3 mm. thick medianly, very densely sericeous-strigose with the tawny hairs 6-8/mm.^{2} and to 7 mm. long. Sepals 3.5-7 × 3.5-6.5 mm., ovate to oblong-ovate with the apices obtuse to rounded, not or scarcely united at bases, often imbricate 0.5-1 mm. Petals deep purple, 9-13 × 8-13 mm., obovate and symmetrical to slightly asymmetrical with the apices rounded or even slightly retuse, the gland-tipped cilia 0.1-0.4 mm. (the terminal few 0.7-1.2 mm.). Filaments 4-6 mm.; anthers 4-7 mm.; connective at anther base 0.7-1 mm., free of the anther 0.2-0.5 mm., the ventral lobes 0.1-0.4 mm. Style 13-25 × 0.4-0.6 mm., exserted 4-11 mm. Ovary 6-7 × 3.5-4 mm., moderately to densely strigulose with gland-tipped hairs on the apical 2.5-3.5 mm., the apical lobes 0.7-1.4 mm. above the locules.

Type Collection and Locality: *Bonpland s.n.* (HOLOTYPE presumably in Herb. Humboldt & Bonpland at P; isotype P); Ecuador, Prov. Loja, "entre Loxa et Malacatos, à une élévation de 2000 mètres."

Type Photographs and Illustrations: Gleason 87-3 (holotype of *B. campylanthum* at K); Rhexies *pl. 20* (1808) (as *Rhexia conferta*); Trans. Linn. Soc. **28**: *pl. 3, f. 33f* (1871) (as *Brachyotum confertum*); Bot. Mag. *pl. 6018* (1873), and *idem*, Fl. Serres **20**: *pl. 2099* (1874) (as *Brachyotum confertum*).

Distribution: central to southern Ecuador, alt. 2000-3500 m.

Pichincha: Cerro Corazón, *Sodiro 470* (BR). Cañar: between Biblián and Cañar, *Camp E-433* (NY), *Haught 3329* (NY, US); Pillzhum, *Jameson s.n.* (holotype of *B. campylanthum* K); near Azogues, *Rose & Rose 22788* (NY, US). Azuay: near Cuenca, *Jameson s.n.* (BR, US, W); along Río Matadero west of Cuenca, *Camp E-1994* (NY); Río Surucuchu west of Cuenca, *Camp E-4203* (NY); Cumbe, *Harling 852* (S); between Cumbe and Nabón, *Penland & Summers 1094* (F, NY); Páramo de Tinajillas, *Camp E-2098* (NY); between Cuenca and Oña, *Hitchcock 21649* (NY, US). Loja: between San Lucas and Oña, *Hitchcock 21548* (NY, US); Loja, *Seemann 774.1* (K).

The Jameson specimens, apart from the holotype of *B. campylanthum*, were numbered 16, 17, and 18 by Gray, but all seem to be sheets of a single collection. There are no differences between *B. campylanthum* and *B. confertum*, and, in various herbaria, both Triana and Cogniaux had labeled different sheets of the same collection with either one or the other of the epithets. Of the 306 examinable flowers among the various collections, 240 were 5-merous; typical of this plurality of 5-mery were such large Camp collections as *E-4203* with 100 of 128 flowers 5-merous, *E-2098* with 24 of 39, *E-433* with 14 of 15, and *E-1994* with 16 of 17. Only one sheet examined of all the collections had a majority of the flowers 4-merous; in *Harling 852*, 9 of the 11 examinable flowers were 4-merous. The ovary trichomes of *B. confertum* are conic, but the brown glandular tips are obvious on some or all of these hairs.

32. Brachyotum cogniauxii Wurdack, sp. nov.

Trichomata minute denseque aspera. Ramuli novelli rotundo-quadrangulati, cum petiolis pedicellisque dense hirsutuli, pilis persistentibus ad 2 mm. longis junioribus pro parte glanduliferis. Petioli 0.5-2 mm. Lamina 5-8(-11) × 3-4 mm. ovata apice rotundo-acuta basi obtusa, nervis primariis 3 supra anguste impressis subtus expressis, secundariis obsoletis; supra modice brevi-strigosa, pilis gracilibus 6-8/mm.^{2} ad 1.5 mm. longis et basi per $\frac{1}{5}$-$\frac{1}{3}$ adhaerentibus; subtus dense laxo-strigosa, pilis 20-25/mm.^{2} et ad 2 mm. longis junioribus pro parte glanduliferis. Flores 4-5-meri in ramulis foliatis brevibus solitarii, bracteis 4 aut 6 persistentibus conjuncte vestiti. Bracteae exteriores 9-10 × 7-8 mm. late ovatae apice late acutae vel obtusae, mediae et interiores 11-15 × 9-12 mm. orbiculares vel late ellipticae apice rotundatae vel late obtusae, omnes extus modice laxo-brevi-strigosae 12-20/mm.^{2} intus modice strigulosae 10-20/mm.^{2}, pilis glanduliferis glandulis plus minusve persistentibus. Hypanthium 5.5-7 × 6-7.5 mm., medio 0.2-0.6 mm. crassum, densissime sericeo-strigosum, pilis 10/mm.^{2} glanduliferis et ad 3 mm. longis. Sepala 7-9.5 × 4-6.5 mm. oblongo-ovata apice late acuta vel anguste obtusa basi per 0.5 mm. cohaerentia intus modice strigulosa pilis 20/mm.^{2} glanduliferis. Petala 14-19 × 10-17 mm. apice rotundata, ciliis glanduliferis 0.1-0.3 mm. Filamenta 5-7 mm.; antherae 5-7 mm.; connectivum basi antherae 1.7-2.7 mm., ab anthera per 1-1.8 mm. liberum, lobis ventralibus magnis 1.2-2.1 mm. longis singulis 0.3-0.7 mm. latis. Stylus 21-27 × 0.5-0.8 mm., per 3-4 mm. exsertus. Ovarium 5-8 × 3.5-5.5 mm., apice per 3.5-5.5 mm. dense strigulosum pilis glanduliferis, lobis apicalibus super loculos 0.4-0.8 mm.

Type Collection and Locality: *Pennell 15660* (HOLOTYPE PH); Peru, Dept. Amazonas, "stony jalca, 3500 m. alt., above Colcamar," 24-26 June 1948. "Shrub. Bracts old rose, yellowish-tipped; sepals maize-yellow; petals black."

Distribution: northern Peru, alt. 2400-3500 m.

Amazonas: Cerro de Fraijaco northeast of Tambo de Ventilla, *Pennell 15843* (PH), *Pennell 15877* (PH); Bagazan, *Mathews (Fielding) 1255* (BR, K); between Piscohuañuno and Bagazan, *Raimondi 1902* (USM); between Almirante and Molinopampa, *Sandeman 52* (K); Río Sonche west of Molinopampa, *Pennell 15760* (PH); Chachapoyas, *Mathews 46H* (BR, K). La Libertad: Cajamarquilla, *Ferreyra 1267* (NY).

The flower-mery is quite unstable in *B. cogniauxii*, with 5 of the collections predominantly 4-merous and 4 predominantly 5-merous; of the 59 examinable flowers, 36 were 4-merous. However, the limited number of flowers precluded any conclusion as to the dominant mery.

This species is abundantly distinct from its nearest relative, *B. confertum*, with which both Triana and Cogniaux confused it. The densely roughened trichomes, spreading stem pubescence, adaxially pubescent and larger bracts and sepals with the hairs gland-tipped, much larger anther tubercles, and smaller apical ovary lobes all separate it from its Ecuadorian relative.

33. Brachyotum trichocalyx Triana, Trans. Linn. Soc. 28: 48. 1871.

Trichomes smooth. Branchlets quadrangular, very sparsely strigulose and very soon glabrescent except for a few short nodal hairs. Petiole 1-3 mm. Blade 5-7 × 3-3.5 mm., ovate with the apex broadly acute to rounded and the base rounded-truncate, the 3 primaries impressed narrowly above and elevated below, the secondaries obsolete; above glabrous; below very sparsely short-strigulose along the veins and glabrous on the surface except for about 4 glandular clusters/mm.^{2} which turn black with age. Flowers 5-merous, solitary on short leafy lateral branches, with the pedicels 3-5 mm. above the last leaves (bracteoles ?). Hypanthium 5-6 × 5-5.5 mm., 0.8 mm. thick medianly, densely beset with stout patent setae 1-3/mm.^{2} and to 5 × 1 mm. Sepals 9.5-10.5 × 5.5-6 mm., ovate to oblong-ovate with the apices broadly acute, united at bases 0.5 mm., somewhat imbricate basally, outside glabrous except for a few setae (to 2 mm. long) at the base of the midrib. Petals 18-19 × 14-15 mm., obovate and slightly asymmetrical with the apices rounded to broadly obtuse, the gland-tipped cilia 0.1-0.4 mm. Filaments 5-5.5 mm., as long as the anthers; connective at anther base 1-1.1 mm., free of the anther 0.3-0.4 mm., ventrally not lobed. Style 21 × 0.6 mm., exserted 6 mm. Ovary 5 × 3 mm., moderately long-strigulose on the apical 2.5 mm., the apical lobes 0.7 mm. above the locules.

Type Collection and Locality: *Jameson s.n.* (HOLOTYPE K); "prope Quito."

Distribution: definitely known only from Prov. Loja, Ecuador.

Azuay-Loja border: near "Tablon de Oña" between Nabón and Zaraguro, *Rose, Pachano & Rose 23094* (NY, US). Loja: near Loja, *Jameson s.n.* (US). Without Province: *Jameson s.n.* (BR, US).

The Jameson collection without definite locality was numbered *15* by Gray; it seems possible that all of the Jameson specimens cited here are parts of one collection and that the holotype was merely sent from, and not collected near, Quito by Jameson. The Rose et al. collection is in fruit, but there is no possibility of misidentification.

The affinities of this species are quite obscure. Vegetatively it is quite similar to *B. nutans* or some of the glabrous forms of *B. lindenii*; the large sepals are reminiscent of *B. strigosum* and *B. fictum*. The enormous hypanthial setae are unique.

34. Brachyotum ecuadorense Wurdack, sp. nov.

Trichomata minutissime sparseque papillata. Ramuli novelli obscure quadrangulati, cum petiolis pedicellisque dense brevi-strigulosi. Petiolus 1-3 mm. Lamina 4-7 × 2.5-5 mm. ovalis vel ovali-oblonga apice late acuta vel obtusa basi obtusa, nervis primariis 3 supra impressis subtus expressis, secundariis obsoletis; supra dense strigulosa, trichomatibus 7-8/mm.^{2} conicis 0.1-0.3 mm. diam. dimidio basali adhaerente apice libero per 0.2-0.5 mm.; subtus densissime strigulosa, setis conicis. Flores plerumque 5-meri, in ramulis brevibus adscendentibus solitarii. Pedicellus super folia ultima 2-5 mm., foliis ultimis (bracteis ?) persistentibus leviter extenuibus. Hypanthium 5.5-6.5 × 4-6 mm., medio 0.2 mm. crassum dense strigulosum setis curvo-conicis 15/mm.^{2} et 0.1-0.2 mm. diam. Sepala 5.5-6.5 × 3.5-4.5 mm. oblonga apice obtusa mucronata basi per 0.7-0.8 mm. cohaerentia, sinu anguste acuto. Petala 12-19 × 11-15 mm. obovata symmetrica apice truncata, ciliis non-glandulosis 0.1-0.2 mm. Filamenta 5.5-6 mm.; antherae 4.5-5.5 mm.; connectivum basi antherae 1.1-1.5 mm., ab anthera per 0.4-0.7 mm. liberum, lobis ventralibus 0.6-0.9 mm. Stylus 22-24 × 0.6 mm., per 3-10 mm. exsertus. Ovarium 6 × 3 mm. apice per 2 mm. dense strigulosum setis non-glandulosis, lobis apicalibus super loculos vix 0.1 mm.

Type Collection and Locality: *Prieto P-307* (HOLOTYPE NY); Ecuador, Azuay-Oriente border, eastern cordillera between Oña and río Yacuambi, crest, alt. 10000-11200 ft., 10-19 Sep. 1945. "Plant single-stemmed below, branched above, 0.5 m. Lvs deep green above. All parts of plant with minute processes. Floral bracts, hypanthium & sepal lobes red. Corolla tubular-urceolate in outline, nigrescent (by very strong transmitted light, petal color deep magenta-purple). Filaments deep rose-magenta, anthers sulfur-yellow." Known only from the type collection.

The closest relative of *B. ecuadorense* seems to be *B. fictum*. *B. ecuadorense* may be intermediate between this species and the poorly defined *B. rosmarini-*

fo*lium*; the Peruvian species, however, differs in its ternate flowers, differently shaped petals with gland-tipped cilia, and glandular ovary hairs, as well as the more roughened pubescence. Only 2 of the 26 examinable flowers in the Prieto collection were 4-merous.

35. **Brachyotum fictum** Wurdack, sp. nov.

Trichomata laevia. Ramuli novelli obscure quadrangulati cum petiolis pedicellisque dense laxo-brevi-strigosi. Petiolus 1–3 mm. Lamina 4–7 × 3–6 mm. ovata vel elliptico-ovata apice rotunda basi obtusa vel truncata, nervis primariis 3 supra et subtus ab pilis occultis, secundariis obsoletis; supra tuberculis crassis tumidis 1–2/mm.^{2} (25–45 per lamina) in series 6–10 leviter irregulariter dispositis onusta, tuberculo abrupte setifero seta 0.1–0.5 mm. longa; subtus in nervis primariis modice setulosa setis ad 2 mm. longis rigidis superficie glabra vel sparse setulosa. Flores 5-meri in ramulis brevibus foliosis solitarii. Pedicellus super folia ultima 1–5 mm., foliis ultimis (bracteis ?) persistentibus leviter extenuibus. Hypanthium 5–6.5 × 4–6 mm., medio 0.3–0.5 mm. crassum, dense laxo-robusto-strigosi setis 5–10/mm.^{2} et ad 2 mm. longis. Sepala 6–8 × 5.5–6 mm. late ovata per 1–2 mm. imbricata basi per 0.3–1 mm. cohaerentia apicibus obtusis recurvis, intus parte ⅓–¾ apicali cum tuberculis eisdem cum laminarum aut robusto-longo-strigulosa. Petala 11–16 × 10–15 mm. obovata apice oblique truncata vel rotunda, ciliis non-glandulosis 0.1–0.4 mm. Filamenta 4.5–5.5 mm.; antherae 4.5–6 mm. poro 0.3–0.4 mm. diam.; connectivum basi antherae 1–1.5 mm., ab anthera per 0.5–0.7 mm. liberum, lobis ventralibus brevibus 0.2–0.3 mm. Stylus 17–20 × 0.6 mm., per 2–4 mm. exsertus. Ovarium 4–5 × 2–3.5 mm. apice per 1.5–3 mm. dense brevi-strigulosum, lobis apicalibus super loculos 0.5–1 mm.

Type Collection and Locality: *Camp E-4852* (HOLOTYPE NY); Ecuador, Azuay-Oriente border, Páramo del Castillo and surrounding forested areas, crest of the eastern cordillera on the trail between Sevilla de Oro and Mendez, alt. 11000–11300 ft., 21 Aug. 1945. "Shrub in clumps, to 0.7 m. Lvs deep green, rugose above; yellowish below; petiole red. Hypanthium red, calycine lobes tipped with green. Corolla nigrescent, of the closed type."

Distribution: known definitely only from the Prov. Azuay-Oriente border in Ecuador, alt. 3000–3500 m.

Azuay: east of El Pan, *Acosta 5107* (F); Páramo de Matanga, *Lehmann s.n.* (K). Without Locality: "Peru," *Lobb 230* (W).

The Lobb collection probably came from near Cuenca. Superficially, *B. fictum* resembles *B. multituberculatum* but probably represents a slightly different line of divergence; the solitary flowers, sepal shape, small-pored anthers, and eglandular petals display affinities with *B. ecuadorense*. From this relative, *B. fictum* may easily be differentiated by the much larger leaf callosities, longer apical ovary lobes, and recurved ovate imbricate sepals which within are tuberculate or stout-strigose.

36. **Brachyotum multituberculatum** Wurdack, sp. nov.

Trichomata laevia. Ramuli novelli obscure quadrangulati cum petiolis pedicellisque dense gracili-hirsuti pilis adscendenti-patentibus ad 1–2 mm. longis. Petiolus 1–2 mm. Lamina 4.5–6 × 3–4.5 mm. ovata vel elliptico-ovata apice basique obtusa, nervis primariis 3 sed ab pilis occultis; supra tuberculis crassis tumidis 2/mm.^{2} (35–40 per lamina) in series 6 regulariter dispositis dense onusta, tuberculo abrupte setifero seto ca. 0.5 mm. longo; subtus dense gracili-hirsuta, pilis 15/mm.^{2} et ad 2 mm. longis. Flores 5-meri conferto-terni bracteis duabus investi, dichasio ab foliis subtento. Pedicellus sub bracteis 3–5 mm., super 2–3 mm.; bracteae 8 × 9 mm. late ovatae apice obtusae, supra parte tertia vel quarta apicali tuberculis dense onustae sed alioqui glabrae, subtus sparse laxo-strigosae, minime usque ad anthesim persistentes. Hypanthium 4 × 5.5 mm., medio 0.3 mm. crassum, modice gracili-strigosum 8-9/mm.^{2} Sepala 4.5 × 3-3.5 mm. oblonga apice late acuta vel anguste obtusa basi per 0.5 mm. cohaerentia, sinu acuto. Petala purpurea 11-12 × 9 mm. asymmetrice obovata apice rotunda, ciliis glandulosis 0.1-0.4 mm. (terminali ad 1 mm.). Filamenta 3.5-4 mm.; antherae 3-3.5 mm., poro 0.5-0.6 mm. diam.; connectivum basi antherae 1.5-2 mm., ab anthera per 1-1.5 mm. liberum, lobis ventralibus 1-1.5 mm. longis singulis 0.6-0.7 mm. latis. Stylus 20 × 0.6 mm., per 7 mm. exsertus. Ovarium 5 × 3.5 mm. apice per 3 mm. dense gracili-strigulosum, lobis apicalibus super loculos 1.5 mm.

Type Collection and Locality: *L. Williams 7587* (HOLOTYPE F; isotype NY); Peru, Dept. Amazonas, "La Jalca" between Chachapoyas and Moyobamba, alt. 2700-3300 m., 21 Jan. 1930. Known only from the type collection.

The closest relative of this species seems to be *B. markgrafii*; it may be distinguished from that species by the leaf tubercles in 6 rows at the widest part of the leaf, the generally finer stem, hypanthial, and lower leaf surface pubescence, the much larger pedicellar bracts, and much longer apical ovary lobes.

37. Brachyotum lymphatum Wurdack, sp. nov.

Trichomata laevia. Ramuli novelli obscure quadrangulati dense hirsutuli pilis gracilibus ad 1 mm. longis. Petiolus 1-4 mm. Lamina 7-14 × 4-10 mm. ovata vel elliptico-ovata apice late acuta basi obtusa vel truncata, nervis primariis 3 supra impressis subtus expressis, secundariis supra invisus subtus leviter angusteque expressis; supra modice brevi-strigosa, pilis 3-5/mm.^{2} et ad 1.5 × 0.25 mm. parte basali $^2\!/_5$-$^1\!/_2$ adhaerente; subtus modice hirsutula, pilis 5-10/mm.^{2} et ad 1 mm. longis, glandulis solitariis 10-15/mm.^{2} Flores 5-meri saepe conferto-terni dichasio ab foliis subtento. Pedicellus sub bracteolis 3-5 mm., super 2-4 mm.; bracteolae 3-5 × 1-2 mm. obovato-ellipticae trinerviae supra glabrae subtus sparse laxo-strigulosae, usque ad anthesim persistentes. Hypanthium 3-4 × 4.5 mm., medio 0.2 mm. crassum, modice laxo-longo-strigulosum 7-10/mm.^{2} Sepala 2.5-5 × 3-4 mm. triangularia vel oblongo-ovata apice late acuta basi per 0.8-1 mm. cohaerentia, sinu late acuto. Petala purpurea 9.5-13.5 × 8-11 mm. obovata et leviter asymmetrica apice rotunda vel leviter obliqua, ciliis non-glandulosis 0.1-0.3 mm. Filamenta 3-5.5 mm.; antherae 2.5-3.5 mm., poro 0.6-0.8 mm. diam.; connectivum basi antherae 1-1.6 mm., ab anthera per 0.7-1.2 mm. liberum, lobis ventralibus 0.7-1 mm. longis singulis 0.5-0.7 mm. latis. Stylus 15-21 × 0.5-0.6 mm., per 6-8 mm. exsertus. Ovarium 3.5-4.5 × 2.5-3.5 mm. apice per 1.5-2 mm. sparse strigulosum, lobis apicalibus super loculos 0.4-0.5 mm.

Type Collection and Locality: *Lehmann 6025* (HOLOTYPE K); Colombia, Dept. Cauca, "Páramo de Guanacas, Central Andes of Popayan, alt. 3300-3600 m."

Type Photograph: Gleason 28-3 (destroyed isotype at B).

Distribution: Dept. Cauca, Colombia, alt. 3300-3600 m.

Between "Perro Muerto y la Laguna del Páez," *Cuatrecasas 19034* (F).

The small large-pored anthers of *B. lymphatum* suggest a general affinity with *B. markgrafii* and its relatives. The leaf pubescence, sepal shape, and eglandular petal cilia are ample distinctions from these Peruvian species. The Berlin isotype had been determined by Cogniaux as *B. trianaei*. In aspect, *B. lymphatum* is quite like several of the Colombian species of *Chaetolepis* and probably will be found in some herbaria misidentified under that genus.

38. Brachyotum markgrafii Wurdack, sp. nov.

Trichomata laevia. Ramuli novelli obscure quadrangulati, cum petiolis pedicellisque modice vel dense laxeque longo-strigulosi, pilis basibus patentibus

apicibus incurvis. Petiolus 1–2 mm. Lamina 4–6 × 3–4.5 mm. ovata apice rotunda basi late obtusa, nervis primariis 3 supra et subtus ab pilis obscuris; supra tuberculis crassis tumidis 1/mm.^{2} (16–28 per lamina) in series 4 regulariter dispositis dense onusta, tuberculo abrupte setifero seta 0.2–0.4 mm. longa; subtus dense setulosa vel appresso-setulosa, pilis ad 2 mm. longis. Flores 5-meri inflorescentiis ut in B. lycopodioidi. Pedicellus sub bracteolis 1–2 mm., super 2–4 mm.; bracteolae 1–2.5 × 0.5–1 mm. ellipticae supra glabrae subtus sparse strigulosae, minime usque ad anthesim persistentes. Hypanthium 3–3.5 × 4–4.5 mm., medio 0.3 mm. crassum, modice vel dense adpresso-setosum pilis 3–4/mm.^{2} et ad 3 × 0.5 mm. Sepala 3.5–4.5 × 2–2.5 mm. oblongo-ovata apice acuta basi per 0.2–0.7 mm. cohaerentia, sinu rotundo. Petala 11–13 × 7–8 mm. asymmetrice obovata apice obtusa vel rotunda, ciliis glanduliferis 0.1–0.4 mm. Filamenta 3.5–4 mm.; antherae 2.5–3 mm., poro 0.7–0.8 mm. diam.; connectivum basi antherae 1.4–1.6 mm., ab anthera per 1–1.1 mm. liberum, lobis ventralibus 0.9–1 mm. Stylus 16–20 × 0.3 mm., per 5 mm. exsertus. Ovarium 3.5 × 2.5 mm. apice per 1.5 mm. modice longo-strigulosum, lobis apicalibus super loculos 0.2–0.6 mm.

Type Collection and Locality: *Pearce s.n.* (HOLOTYPE K); Peru, Dept. Huánuco, "Cordillera of Pozuzo 10–11000 ft., July 1863. Evg. shrub 4–6 ft. Blue."

Type Photograph: Gleason 88-12 (holotype).

Distribution: Depts. Huánuco and Junín, Peru, alt. 3000–3100 m.

Junín: Huacapistana, *Weberbauer 2072* (F, G-DEL).

This species is very closely related to *B. lycopodioides*, but differs in the smooth trichomes, more ovate leaf blades (the length/width ratio mostly less than 1.5, rather than mostly greater than 2), slightly greater average number of tubercles per leaf, and much stouter and more patent hairs on the stems, lower side of the leaves, and hypanthium. The hypanthium is moderately covered with stout hairs with patent bases and incurved tips, rather than very densely short-strigose. The type sheet is a syntype of *B. lycopodioides*.

39. Brachyotum lycopodioides Triana, Trans. Linn. Soc. 28: 49. 1871.

Brachyotum minimum Markgraf, Notizbl. Bot. Gart. Berlin 13: 459. 1937.

Trichomes minutely but moderately roughened. Branchlets obscurely quadrangular, densely to moderately strigose. Petiole 1–2 mm. Blade 3–5 × 2–2.5 mm., ovate to oblong-elliptic with the apex rounded and the base obtuse, the 3 primaries completely hidden by the pubescence; above completely covered with stout tubercles 1/mm.^{2} in 4 rows at widest part of the blade and 12–20 per blade, with their abruptly attenuate tips about 0.5 mm. long; below very densely short-strigose. Flowers 5-merous, compact-ternate or with an additional pair of flowers at the node below the dichasial node or also with another additional pair at the next-lower node, the dichasium subtended by leaves. Pedicel 0–3 mm. below the bracteoles, 2–3 mm. above; pedicellar bracteoles 2.5–4 × 1.5–2 mm., elliptic and 3-nerved, mostly persistent until anthesis, above glabrous, below densely strigulose. Hypanthium 3–3.5 × 4.5 mm., 0.3 mm. thick medianly, densely sericeous-strigose, the hairs 6–12/mm.^{2} and to 2 mm. long. Sepals 3–4 × 2.5–3 mm., ovate to oblong-ovate with acute apices, united at bases 0.5–0.7 mm., the sinuses acute. Petals light violet (fide Pennell), 12–14 × 9–10 mm., asymmetrically obovate with obtuse to rounded-obtuse apices, the gland-tipped cilia 0.1–0.2 mm. (the terminal one 0.3–0.4 mm.). Filaments 3.5–4 mm.; anthers 2–3 mm., with the flaring apical pore 0.5 mm. in diam. and nearly as wide as the anther; connective at anther base 0.6–2 mm., free of the anther 0.3–1.2 mm., the ventral lobes 0.4–1.1 mm. Style 15–17 × 0.3–0.4 mm., exserted 4–5 mm. Ovary 3–4 × 2.5–3 mm., densely strigulose on the apical 1–1.5 mm., the apical lobes 0.1–0.2 mm. above the locules.

Type Collection and Locality: *Mathews 1254* (LECTOTYPE K); Peru, Dept. Amazonas, "ad Bajasan prov. Chachapoyas."

Illustration: Weberbauer, El Mundo Vegetal de Los Andes Peruanos 525, *f. 61a* (1945).

Distribution: Dept. Amazonas, Peru, alt. 3000–3200 m.

Cerro de Fraijaco northeast of Tambo de Ventilla, *Pennell 15854* (PH); Piscohuañuma Pass, *Sandeman 57* (K).

Markgraf recognized the two entities involved in the collections of *B. lycopodioides* and *B. markgrafii*, but did not realize that Triana's description encompassed both elements. Unfortunately, Macbride (1941, p. 269) designated *Mathews 1254* as the type collection of *B. lycopodioides*, and this collection coincides with *B. minimum*. Triana's description is so inconclusive that Macbride's designation must stand, thus synonymizing Markgraf's epithet.

The packet containing the only specimen examined of *Weberbauer 4399* (BR, collected at Chachapoyas) has a mixture of *B. lycopodioides* and *B. markgrafii*. The photograph (Gleason 27-9) of a sheet of this collection at Berlin seems to indicate that a portion of another collection, perhaps *Weberbauer 2072* which is *B. markgrafii*, was inadvertently mixed with *Weberbauer 4399*.

40. Brachyotum rosmarinifolium (R. & P.) Triana, Trans. Linn. Soc. 28: 49. 1871.

Rhexia rosmarinifolia R. & P. Fl. Peruv. & Chil. 3: 84. 1802.
Arthrostemma rosmarinifolia (R. & P.) DC. Prodr. 3: 136. 1828.
Chaetogastra rosmarinifolia (R. & P.) Naudin, Ann. Sci. Nat. III. 14: 131, quoad syn. 1850.

Trichomes very minutely and sparsely to moderately roughened (to smooth ?). Branchlets obscurely quadrangular, moderately to densely strigulose. Petiole 1–3 mm. Blade 6–12 × 3–4 mm., oblong-elliptic to lance-oblong with the apex and base obtuse, the 3 primaries deeply impressed above and below elevated, the 6–10 pairs of secondaries obscured by the pubescence above and below; above densely strigulose, the stout hairs 3–8/mm.^{2} with their basal ⅓–½ adherent and 0.1–0.3 mm. diam. but apically gradually attenuate; below very densely strigulose. Flowers predominantly 5-merous, mostly ternate but occasionally with an additional pair of flowers at the node below the dichasial node and then the slightly reduced leaves subtending the dichasium early caducous. Pedicel 1–3 mm. below the bracteoles, 1–8 mm. above; pedicellar bracteoles 4–9 × 1–2 mm., narrowly elliptic, early caducous, pubescent as the leaves except for the glabrous adaxial apical ¼–¾. Hypanthium 4.5 × 4.5 mm., 0.3 mm. thick medianly, moderately to densely strigulose to short-strigose, the hairs 10–12/mm.^{2} Sepals 6–6.5 × 3–4 mm., oblong with obtuse apices, united at bases 1 mm., the sinuses acute. Petals deep purple, 15–16 × 12–13.5 mm., asymmetrically obovate with obtuse apices, the gland-tipped cilia 0.3–0.4 mm. Filaments 5–5.5 mm.; anthers 5 mm.; connective at anther base 1.7–2.2 mm., free of the anther 0.8–1.4 mm., the ventral lobes each 0.3–1.2 × 0.6–0.7 mm. Style 23 × 0.5 mm., exserted 6–9 mm. Ovary 5.5 × 3 mm., densely strigulose with gland-tipped hairs on the apical 2–2.5 mm., the apical lobes 0.2–0.3 mm. above the locules.

Type Collection and Locality: *Ruiz & Pavón s.n.* (SYNTYPES presumably at MA; isosyntype F); Peru, Depts. Huánuco and Junín, "in Huanuci et Tarmae."

Type Photographs & Illustrations: F16907 and Gleason 27-10 (destroyed syntype at B); Fl. Peruv. & Chil. 3: *pl. 318, f. a* (1802) (as *Rhexia rosmarinifolia*).

Distribution: central Peru, alt. 3000–4200 m.

Huánuco: Mito, *Macbride & Featherstone 1870 p.p.* (F, G-DEL p.p., NY); "Torrehuasi," *Woytkowski 326* (F).

This species was described originally as having 4-merous flowers, but some 5-merous fruits. All except 1 of the 11 examinable flowers in *Macbride & Featherstone 1870 p.p.* were 5-merous, and all the fruits on the syntype were 5-merous. The trichomes of *Woytkowski 326* are smooth and it may well be that this specimen represents "pure" *B. rosmarinifolium*, since the Macbride & Featherstone collection is part of the hybrid mixture described under *B. lutescens*; the trichomes on the syntype are very minutely and sparsely roughened, and some of the vegetative hairs are gland-tipped, so this specimen too may be the result of the introgression of *B. lutescens*. The salient features of *B. rosmarinifolium* seem to be the ternate inflorescences, firm oblong sepals, large anther appendages, and gland-tipped ovary hairs.

41. **Brachyotum figueroae** Macbride, Field Mus. Pub. Bot. 4: 173. 1929.

Trichomes moderately and densely roughened. Branchlets obscurely quadrangular, densely hirsute, the hairs to 2 mm. long and a very few of them gland-tipped. Petiole 2–3 mm. Blade 7–12 × 4–7 mm., elliptic to ovate-elliptic with the apex acute and the base broadly acute to obtuse, the 3 primaries impressed above and elevated below, the 8–10 pairs of secondaries completely obscured by the pubescence; above densely long-strigulose, the hairs 8–10/mm.^{2}, each on a low bulla with the basal ⅓ of the hair adherent (to 0.3 mm. diam.) and the free apical portion rather abruptly attenuate; below very densely hirsutulous. Flowers predominantly 5-merous, ternate or with an additional pair of flowers at the node below the dichasial node, the persistent leaves subtending the dichasium slightly reduced, the peduncle not differentiated. Pedicel 1–3 mm. below the bracteoles, 2–4 mm. above; pedicellar bracteoles 2.5–3.5 × 0.2–0.4 mm., narrowly spatulate, persistent at least until anthesis, above glabrous, below moderately loose-strigulose. Hypanthium 7 × 5.5 mm., 0.3 mm. thick medianly, sparsely strigulose 7–12/mm.^{2} Sepals 5–5.5 × 4–4.5 mm., oblong-ovate with the apices broadly blunt-acute, united at bases 0.4–0.6 mm., the sinuses acute. Petals "whitish," 10–12 × 7.5–9.5 mm., asymmetrically obovate with the apices obliquely truncate, the gland-tipped cilia 0.1–0.2 mm. (the apical few to 0.5 mm.). Filaments 5–5.5 mm.; anthers 6–6.5 mm.; connective at anther base 1–1.3 mm., free of the anther 0.3–0.5 mm., the ventral lobing 0.5–0.7 mm. Style 24 × 0.6 mm., exserted 9 mm. Ovary 6.5 × 3.5 mm., densely strigose with gland-tipped hairs on the apical 3 mm., the apical lobes 0.3 mm. above the locules.

Type Collection and Locality: *Macbride & Featherstone 2504* (HOLOTYPE F; isotypes G-DEL, NY); Peru, Dept. Ancash, "Catuc" 25 km. east of Huarás. Known only from the type collection.

Vernacular Name: Cotchkis blanco.

All of the 21 examinable flowers were 5-merous. Macbride apparently saw a few 4-merous flowers since he cited the flowers as 4- or 5-merous.

That *B. figueroae* should be maintained as distinct from the *B. rostratum* complex is extremely doubtful. The only character separating the species is the distinct development of anther tubercles in *B. figueroae*. Slight tendencies in this direction have been observed in the "trianae" element of *B. rostratum* (up to 0.15 mm. free of the anther). *B. figueroae* probably represents another degree of sorting-out of the complex between *B. rostratum* and *B. rosmarinifolium*.

42. **Brachyotum rostratum** (Naudin) Triana, Trans. Linn. Soc. 28: 48. 1871.

Chaetogastra rostrata Naudin, Ann. Sci. Nat. III. 14: 135. 1850.
Chaetogastra microphylla Naudin, Ann. Sci. Nat. III. 14: 136. 1850.
Brachyotum microphyllum (Naud.) Triana, Trans. Linn. Soc. 28: 49. 1871. Non sensu Cogniaux; DC. Monog. Phan. 7: 164. 1891.
Brachyotum trianaei Cogniaux, DC. Monog. Phan. 7: 167. 1891.
Brachyotum callosum Macbride, Field Mus. Pub. Bot. 4: 172. 1929.

Trichomes minutely and moderately roughened. Branchlets obscurely quadrangular, densely to moderately fine-hirsute to strigose or strigulose, the hairs mostly eglandular, occasionally with some intermingled gland-tipped hairs. Petiole 1-6 mm. Blade (5-)10-25 × (2-)5-13 mm., ovate to elliptic or oblong-elliptic with the apex bluntly acute or rounded and the base obtuse to truncate, the 3 primaries narrowly impressed above and elevated below, the 8-15 pairs of secondaries above obscurely impressed or obsolete and below narrowly elevated but mostly obscured by the pubescence; above moderately short- (rarely long-) strigose, the hairs 2-5(-8)/mm.^{2} on low callosities and in 10 or more irregular rows with the adherent expanded bases 0.2-0.5(-1.5) mm. diam. and the more or less abruptly attenuate free apices (0.2-)0.5-1(-3) mm. long; below densely to very densely loose-strigulose to fine-hirsutulous, the hairs (10-)15-30/mm.^{2} and mostly eglandular but occasionally with intermingled gland-tipped hairs, the glands solitary and dense (15-60/mm.^{2}) but obscured by the trichomes. Flowers predominantly 5-merous, mostly ternate (rarely a few solitary) or sometimes with an additional pair of flowers at the node below the dichasial node or the dichasia ternate. Peduncle of dichasium (5-)10-25 mm. long and slender (about $\frac{1}{2}$-$\frac{2}{3}$ diam. of the supporting branchlet); bracts at base of the dichasium 3-10 × 1-4 mm., persistent until anthesis, with pubescence as in leaves or above glabrous. Pedicels 0.5-7 mm. below bracteoles, 1-7 mm. above; pedicellar bracteoles 1.5-6 × 0.3-2 mm., mostly caducous before anthesis, above glabrous or apically strigulose, below moderately loose-strigulose. Hypanthium 4-8 × 4-6 mm., 0.2-0.5 mm. thick medianly, sparsely to moderately strigulose or appressed-hirsutulous, the fine hairs 6-12(-15)/mm.^{2} and eglandular or in part gland-tipped. Sepals 4-7 × 3-4.5 mm., narrowly oblong-ovate to triangular-ovate with the apices acute, united at bases 0.6-1 mm., the sinuses rounded-acute. Petals yellowish (or purple fide Naudin), 9-16 × 8-12 mm., asymmetrically obovate with the apices obliquely truncate, outside glabrous or very sparsely strigulose at base and apex, the gland-tipped cilia 0.1-0.5 mm. Filaments 3.5-7.5 mm.; anthers 4-6.5 mm.; connective at anther base not prolonged (rarely free of anther 0.15 mm. or less). Style 15-20 × 0.5-0.7 mm., exserted 4-8 mm. Ovary 4-7 × 2.5-3.5 mm., moderately strigulose on the apical 2-3 mm., usually the hairs in part gland-tipped, the apical lobes 0.1-0.3 mm. above the locules.

Type Collection and Locality: *Dombey s.n.* (HOLOTYPE presumably at P; isotypes BM, BR, F, G-DEL, L, P, US); "Peruvia," probably in Depts. Huánuco, Pasco, or Junín.

Type Photographs: F38256 (isotype of *B. rostratum* at P); Gleason 27-12 and F16718 (destroyed isotype of *B. rostratum* at B); F36133 (holotype of *B. microphyllum* at P); Gleason 51-4 (isotype of *B. trianaei*, at G-DC ?); F16719 (destroyed isotype of *B. trianaei* at B); F63423 (holotype of *B. callosum* at F).

Distribution: north central to southeastern Peru, alt. 3100-4100 m.

Cajamarca: Llama, *Sandeman 4118* (K). Ancash: between Tallenga and Pachapaque, *Ferreyra 7504* (USM). Huánuco: northeast of Huánuco, *Macbride & Featherstone 2181* (holotype of *B. callosum* F; isotypes G-DEL, NY, S, US); south of Mito, *Macbride & Featherstone 1871 p.p.* (A p.p., F p.p., W). Junín: Goyllarisquisga, *Asplund 11900* (S); Huacapistana, *Weberbauer 2218* (BR, G-DEL, S); between Vitoc and Palca, *Isem 583* (F); Hda. Runatullu, *Ochoa 206* (S, US). Huancavelica: between Salcabamba and "Ampurco," *Stork & Horton 10429* (F, G-DEL, UC). Cuzco: Paso de Tres Cruces, *Pennell 13847a* (NY, PH), *Vargas 2057* (NY); Paucartambo, *Soukup 387* (F). Puno: "Tabina" near Ayapata, *Lechler 2061* (holotype of *B. trianaei* BR; isotypes BR, G-BOIS, K, P, S, W; fragment F); near Limbani, *Metcalf 30548* (G-DEL, NY, UC, US). Without Department: *Bonpland s.n.* (holotype of *B. microphyllum* P; fragment F); *Raimondi 9439* (USM).

Vernacular Name: Pinchos *(Ochoa 206)*.

Of the 141 examinable flowers in the various collections ascribed to this species, all except 20 were 5-merous. All except 6 of the 39 examinable flowers of *Lechler 2061* were 5-merous, although *B. trianaei* was described as 4-merous.

The degree of distinctness of this complex from *B. lutescens* is dubious; some specimens vary toward *B. lutescens* and some toward *B. rosmarinifolium*. The interplay of appressed and patent stem pubescence and glandular and non-glandular stem, lower leaf surface, and hypanthial trichomes certainly permits no specific distinctions between the species synonymized under *B. rostratum*. "Typical" *B. trianaei (B. callosum)* has spreading to appressed stem pubescence, loosely appressed to spreading lower leaf surface hairs, and appressed to loosely appressed hypanthial hairs, all such hairs being eglandular except for a very few of the sinusal ones; such collections are *Isern 583*, *Lechler 2061*, *Macbride & Featherstone 2181*, *Metcalf 30548*, *Raimondi 9439*, and *Stork & Horton 10429*. *Dombey s.n.* and *Ferreyra 7504* have very long, dense, spreading to loosely appressed stem hairs, with gland-tipped ones more or less abundantly intermingled with the non-glandular on the stems, lower leaf surfaces, and hypanthia; the leaves are ovate to ovate-elliptic. *Asplund 11900*, *Ochoa 206*, *Pennell 13847a*, *Soukup 387*, and *Vargas 2057* have mostly lanceolate to oblong leaves which have non-glandular hairs beneath (except *Asplund 11900*) and many of the hypanthial hairs gland-tipped; the style of *Vargas 2057* is very sparsely beset with stout spreading hairs on the basal ⅓. In *B. microphyllum*, the young leaves on the flowering branches are elliptic to oblong, but the leaves on vegetative shoots are ovate; the hairs on the upper leaf surfaces have exceptionally well-developed calloused bases; only a very few stem hairs, the petal cilia, and the young ovary hairs are gland-tipped; such collections are *Bonpland s.n.* and *Sandeman 4118*. Except for the greater pubescence density and longer free apices on the upper leaf surface hairs, these two specimens resemble the "trianaei" element, having similar scanty development of gland-tipped hairs.

Jameson s.n. (K), from Pillzhum in Ecuador, resembles *B. rostratum* in its ternate 5-merous flowers with glandular hypanthia, but the leaves are much less pubescent beneath than usual and the connective is free of the anther base 0.2 mm.; further collections are needed to establish the status of this specimen.

43. Brachyotum lutescens (R. & P.) Triana, Trans. Linn. Soc. 28: 48. 1871.

Rhexia lutescens R. & P. Fl. Peruv. & Chil. 3: 84. 1802.
Arthrostemma lutescens (R. & P.) DC. Prodr. 3: 136. 1828.
Alifana lutescens (R. & P.) Raf. Syl. Tell. 101. 1838.
Chaetogastra lutescens (R. & P.) Naudin, Ann. Sci. Nat. III. 14: 134, quoad syn. 1850.

Trichomes minutely but moderately roughened, those on the branchlets, lower leaf surfaces, hypanthia, and sepals in part gland-tipped at least when young, on upper leaf surface often gland-tipped. Branchlets obscurely quadrangular, very densely hirsute with the hairs to 2–3 mm. long. Petiole 2–5 mm. Blade (8–)10–18 × (4–)6–9 mm., ovate to elliptic-ovate with the apex blunt-acute and the base obtuse to subtruncate, the 3 primaries impressed above and elevated below, the 10–15 pairs of secondaries obscurely impressed above and thinly elevated below but hidden by the pubescence; above moderately loose-strigose, the hairs 3–6/mm.^{2} on very low bullae with their basal ¼–⅓ adherent and slightly expanded and the apical free portion to 1.5 mm. long; below moderately to densely hirsute, the hairs 9–12/mm.^{2} and to 2 mm. long; the glands solitary and dense (40–60/mm.^{2}). Flowers predominantly 4-merous, the inflorescences and flowers otherwise as in *B. rostratum*.

Type Collection and Locality: *Ruiz & Pavón s.n.* (SYNTYPES presumably at MA; isosyntypes BM, BR, F, G-BOIS, G-DEL, P); Peru, Dept. Huánuco, "in montibus Chaclla ad Piñapata et in Muna ad Tambo."

Type Photographs and Illustrations: Gleason 28-2 and F16713 (destroyed syntype at B); Fl. Peruv. & Chil. 3: *pl. 319, f. a* (1802) (as *Rhexia lutescens*, with 5-merous flowers however).

Distribution: Dept. Huánuco, Peru, alt. 1800–3100 m.

Near Mito, *Macbride & Featherstone 1871 p.p.* (A p.p., F p.p.), *Macbride & Featherstone 1872* (F, G-DEL, NY, S); "Yanano," *Macbride 4927* (F, NY, US).

Of the 61 examinable flowers in the various collections of *B. lutescens*, 55 were 4-merous, and only 6 5-merous.

That only 2 morphologic "Urpflanzen" are involved between *B. lutescens* and *B. rosmarinifolium* seems evident from the limited series of available specimens; one, represented by *B. lutescens*, is glandular-pubescent on all external surfaces of stems, leaves, hypanthia, and calyces, the pubescence patent, the flowers 4-merous with the connective not prolonged ventrally; the other, represented by *B. rosmarinifolium*, is completely eglandular on these surfaces, the pubescence strictly appressed, and the flowers 5-merous with a prominently prolonged connective. Various combinations of these characters have segregated, apparently permanently in the wide-ranging *B. rostratum. Macbride & Featherstone 1870, 1871*, and *1872*, from one locality, seem to represent a hybrid swarm between the two "Urspecies," with *1872* being "pure" *B. lutescens*. One sprig of *1870* (G-DEL), not included in the specific description of *B. lutescens*, has eglandular leaf trichomes and 4-merous flowers with only a few gland-tipped hypanthial hairs, but otherwise this number is a mixture of 5-merous elements; one 5-merous sprig of this number (F) has the leaves of *B. rosmarinifolium*, but large patent gland-tipped hypanthial hairs. Unfortunately there are no label notes on this puzzling series, and the populations (?), if originally collected separately, have been indiscriminately mixed in the specimens distributed to various herbaria.

44. Brachyotum angustifolium Wurdack, sp. nov.

Hypanthii et laminarum superficiei inferae trichomata basi sparse minuteque muricata ceterarum partium laevia. Ramuli novelli obscure quadrangulati, cum petiolis pedunculis pedicellisque dense longo-strigulosi. Petiolus 1–4 mm. Lamina 7–17 × 1.5–3.5 mm. anguste oblonga apice basique obtusa, nervis primariis 3 supra impressis subtus expressis, secundariis obsoletis; supra tuberculis 5–7/mm.^{2} in series 6 regulariter dispositis dense onusta, tuberculo basi 0.3–0.5 mm. diam. abrupte setifero seta appressa 0.1–0.3 mm. longa; subtus densissime strigulosa 30–40/mm.^{2} Flores 5-meri saepe terni; dichasii pedunculus gracilis 10–20 × 0.5 mm., bracteolis ad basim dichasii 4–6 × 0.5–0.7 mm. linearibus vel leviter spathulatis valde (ante anthesim) caducis supra glabris vel apicem versus strigulosis subtus modice strigulosis. Pedicellus sub bracteolis 0.5–2 mm., super 5–8 mm.; pedicelli bracteolae 2–5 × 0.2–0.7 mm. lineares uninerviae valde caducae supra glabrae subtus sparse strigulosae. Hypanthium 4–5 × 3.5–4.5 mm. triangularia vel ovato-triangularia apice acuta basi per 0.5–0.7 mm. cohaerentia sinu late acuto. Petala 10–11 × 6–7 mm. asymmetrice obovata apice oblique truncata, ciliis glanduliferis 0.1–0.7 mm. Filamenta 5–5.5 mm.; antherae 4.5–5 mm.; connectivum basi antherae nec producto nec libero. Stylus 20 × 0.6 mm., per 7 mm. exsertus. Ovarium 4–5 × 2.5–3 mm. apice per 2–2.5 mm. modice longo-strigulosum setis pro parte glandulosis, lobis apicalibus super loculos 0.2–0.4 mm.

Type Collection and Locality: *Mathews 1253* (HOLOTYPE K); Peru, Dept. Amazonas, "Bajasan, Prov. Chachapoyas, 1835."

Type Photograph: Gleason 27-11 (*Weberbauer 4426*, destroyed paratype at B).

Distribution: Dept. Amazonas, Peru, alt. 3000–3300 m.

Chachapoyas, *Weberbauer 4426* (BR); without locality (but probably from Chachapoyas), *Mathews 1231* (BR).

B. angustifolium is closely related to *B. rostratum* but differs in the nearly smooth trichomes, narrowly oblong leaves with length/width ratio greater than 3.5 (mostly greater than 4) and with constantly 6 rows of tubercles on the adaxial surface, and the linear early caducous bracts; the length/width ratio is approximated by the young leaves of part of *B. rostratum* (*B. microphyllum*), but the tubercles in even these elements are rather irregularly arranged in 10 or more rows. *B. seorsum* may be distinguished by the leaves of different shape with tubercles disposed in 8 or more irregular rows, the glandular hypanthia, and the differently shaped sepals.

45. Brachyotum seorsum Wurdack, sp. nov.

Trichomata minute sparseque aspera. Ramuli novelli obscure quadrangulati, cum petiolis pedunculisque dense brevi-strigosi. Petiolus 2-4 mm. Lamina 12-21 × 4-8 mm. elliptica apice hebeti-acuta basi acuta, nervis primariis 3 supra impressis subtus expressis, secundariis utrinque 8-15 supra occultis subtus expressis reticulatisque; supra dense tuberculato-strigulosa, tuberculis 5-7/mm.^{2} sed non regulariter in lineas dispositis basi 0.4-0.5 mm. diam. apice abrupte setiferis seto 0.3-0.5 mm. longo; subtus densissime strigulosa. Flores plerumque 5-meri saepe terni, flore in medio dichasii interdum aborto; pedunculus gracilis nutans 10-20 × 0.5 mm., bracteolis ad basim dichasii 2-4 × 0.3-0.4 mm. linearibus valde caducis supra glabris subtus strigulosis. Pedicellus sub bracteolis 0.5-10 mm. longus dense strigulosus super bracteolis 3-6 mm. longus glanduloso-hirsutus; pedicelli pedunculique bracteolae eaedem. Hypanthium 5-6 × 4.5-6 mm., medio 0.3 mm. crassum, modice glanduloso-hirsutum, pilis 8-10/mm.^{2} plerumque basibus expansibus apice abrupte setiferis seta 0.4-0.7 mm. longa glandulifera cum pilis paucioribus (40%) appressis non-glandulosis intermixtis. Sepala 5-6 × 3.5-4 mm. lanceolata apice anguste acuta basi 0.5-0.7 mm. cohaerentia, sinu lato rotundato. Petala 10-11 × 7-9 mm. asymmetrice obovata apice oblique truncata, ciliis glanduliferis 0.1-0.7 mm. Filamenta 5-5.5 mm.; antherae 5-5.5 mm.; connectivum basi antherae ab anthera non liberum sed cum papilla juxtim basim 0.1-0.15 mm. longa. Stylus 15-18 × 0.5-0.6 mm., per 5-7 mm. exsertus. Ovarium 4.5-5 × 2.5-3 mm. apice per 1.5-2 mm. setulis conicis appressis glanduliferis modice vestitum, lobis apicalibus super loculos 0.2-0.3 mm.

Type Collection and Locality: *Camp E-5161* (HOLOTYPE NY); Ecuador, Prov. Azuay, páramo and subpáramo area north and northwest of Páramo del Castillo, about 6-8 km. north-northeast of Sevilla de Oro, 10000-11000 ft. elev., 31 Aug. 1945. "Straggling shrubs to 4 m. (lower on páramo but just coming into bud). Lvs deep green above, pale-ochraceous below. Hypanthium dull crimson, pubescence nigrescent. Corolla narrowly urceolate in outline at anthesis; body of petals suffused with pink, veins deep red, margins greenish-yellow." Known only from the type collection.

An analysis of the floral patterns in this species is presented in the introduction to this revision and in Figure 23. *B. seorsum* is related to *B. angustifolium* and to *B. rostratum*. From the latter species, it may be differentiated by the linear early-caducous peduncular bracteoles, the somewhat different leaf-shape, and the generally wider sepalar sinuses with the lobes tapering evenly to the apices rather than tending to be oblong and less acute. While having other single characters in common with various elements assigned to *B. rostratum*, the combination in *B. seorsum* gives an appearance quite distinct from any of these elements. For example, in none of the specimens of *B. rostratum* does there appear the combination of strictly appressed non-glandular pubescence below the pedicellar bracteoles and patent gland-tipped trichomes only above these bracteoles. The tubercles on the older leaves of specimens of the Peruvian species tend to become discrete, exposing the epidermis, but in *B. seorsum*, the older leaves are still completely covered with tubercles. The secondary veins are never as obviously reticulate in *B. rostratum* as in the Ecuadorian species.

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INDEX TO EXSICCATAE

A. Numerical Order of Taxa

1. *B. quinquenerve*
   a. var. *quinquenerve*
   b. var. *pusillum*
2. *B. campanulare*
3. *B. benthamianum*
4. *B. andreanum*
5. *B. campii*
6. *B. rotundifolium*
7. *B. parvifolium*
8. *B. barbeyanum*
9. *B. intermedium*
10. *B. radula*
11. *B. maximowiczii*
   a. var. *maximowiczii*
   b. var. *longifolium*
12. *B. racemosum*
13. *B. gleasonii*
14. *B. ledifolium*
15. *B. weberbaueri*
16. *B. gracilescens*
17. *B. fraternum*
18. *B. rugosum*
19. *B. microdon*
20. *B. sanguinolentum*
21. *B. grisebachii*
22. *B. huancavelicae*
23. *B. nutans*
24. *B. naudinii*
25. *B. tyrianthinum*
26. *B. cernuum*
27. *B. lindenii*
28. *B. alpinum*
29. *B. strigosum*
30. *B. jamesonii*
31. *B. confertum*
32. *B. cogniauxii*
33. *B. trichocalyx*
34. *B. ecuadorense*
35. *B. fictum*
36. *B. multituberculatum*
37. *B. lymphatum*
38. *B. markgrafii*
39. *B. lycopodioides*
40. *B. rosmarinifolium*
41. *B. figueroae*
42. *B. rostratum*
43. *B. lutescens*
44. *B. angustifolium*
45. *B. seorsum*

B. Collectors and Collections

Initials only are cited for given names of well-known collectors. For recent Latin American natives or Spaniards, names as complete as possible, including matronymics, are given.

Acosta Solis, Misael. *5107* (35); *6278* (28); *6616, 7116* (14); *7231* (28); *7533, 7534, 8062* (14); *8299* (27); *8737* (14); *9075* (16); *10546* (27); *11039, 11345* (14).

André, Édouard F. *556* (14); *817* (27); *1018* (14); *1075* (27); *1084, 1261* (29); *1464* (14); *4501* (6); *s.n.* (4).

Anthony, H. E. & Tate, G. H. H. *211, 352* (14).

Aristé Joseph, Fr. *A292* (29).

Asplund, Erik. *1803, 1845* (19); *6371, 6926, 8632* (14); *10393* (27); *11900* (42); *12861, 13512* (1a).

Balls, E. K. *5773* (14); *B6249, B6277* (19); *B6714* (23); *B6813* (1a); *B6894, B6928* (24).

Bang, Miguel. *695* (19); *2860* (20); *s.n.* (19).

Barkley, Fred A., Garcia y Barriga, Hernando, & Vanegas, R. *17C804* (29).

Bonpland, A. J. A. *s.n.* (2, 4, 14, 26, 29, 30, 31, 42).

Bridges, Thomas. *s.n.* (19).

Buchtien, Otto. *219, 2916* (19); *4001* (21).

Burkart, Arturo Erardo & Troncoso, Nélida S. *11264* (19).

Camp, W. H. *E-71* (2); *E-302* (14); *E-433* (31); *E-1629* (5); *E-1994* (31); *E-1998A, E-1998B* (30); *E-2098* (31); *E-2278* (30); *E-4118* (13); *E-4203* (31); *E-4586* (16); *E-4852* (35); *E-4871* (17); *E-5161* (45).

Cardenas, Martin. *1315, 3056, 3214, 3981* (19).
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Castillón, León. *399, 538, 9378, 9474* (19).
Cook, O. F. & Gilbert, G. B. *720* (24); *1171* (1a); *1244* (23); *1861* (21).
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Ferreyra Huerta, Ramón Alejandro. *1231* (1a); *1267* (32); *1713, 1732, 1795, 2113* (1a); *2795, 3291* (24); *3607, 3759* (1a); *7504* (42); *8078, 8182* (1a).
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Pittier de Fábrega, Henri F. *1343* (14).
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Flora of Bermuda, by Nathaniel Lord Britton. 585 pages, 519 figures. 1918. $3.50.

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Addisonia. Colored plates of flowering plants, accompanied by popular descriptions; eight plates in each number, thirty-two in each volume. Now in its twenty-second volume. 1916- Free to members of the Garden; to others $10.00 a volume.

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J. P. M. Brenan and Collaborators 409

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New York 58, N. Y.

PLANTS COLLECTED BY THE VERNAY NYASALAND EXPEDITION OF 1946

(Continued from Page 256)

J. P. M. BRENAN AND COLLABORATORS

LEGUMINOSAE (*Continued*)

Amphicarpa africana (Hook. f.) Harms, Repert. Sp. Nov. 17: 136. 1921; Bak. f. Leg. Trop. Afr. 354. 1929; Robyns, Fl. Parc Nat. Albert 1: 339. *pl. 32.* 1948.

Shuteria africana Hook. f. Jour. Linn. Soc. Bot. 7: 190. 1864.

Zomba District: Zomba Plateau, occasional in rain-forest regrowths, vine 1 m. high, flowers dark purple, 1450 m., June 3, 1946, *16185*; occasional in grasslands, vine 1 m. high, flowers purple, 1500 m., June 5, 1946, *16244*. Abyssinia, Belgian Congo, Uganda, Kenya, Tanganyika Territory, and Nyasaland; also on the Cameroon Mountain in West Africa.

My colleague Mr. H. K. Airy-Shaw tells me that he considers there to be no justification for the rather arbitrary alteration of Elliott's original spelling *(Amphicarpa)* into *Amphicarpaea* made by De Candolle (Mém. Leg. 9: 360. 1825) on account of the supposedly adjectival, not substantival, ending of *Amphicarpa*.

Erythrina abyssinica Lam. Encyc. 2: 392. 1786; Louis, Bull. Jard. Bot. Brux. 13: 306. 1935.

Erythrina tomentosa R. Br. in Salt, Voy. Abyss. Append. 65. 1814, nomen nudum; R. Br. ex A. Rich. Tent. Fl. Abyss. 1: 213, 1847, cum descr.; Bak. f. Leg. Trop. Afr. 373. 1929.

Kota-kota District: Kasabula's Village, sporadic on formerly cultivated land, tree 10–20 m. tall and 40–60 cm. in diameter, very thick pale brown corky bark and dense shapely crown, branches with or without scattered short prickles, leaves deciduous or semi-deciduous, flowers red, appearing before the leaves, 1000 m., Aug. 3, 1946, *17114*. Native name (Chinyanja), mlindimila. Eastern and central tropical Africa from the Anglo-Egyptian Sudan southwards to Nyasaland and S. Rhodesia.

Mucuna stans Welw. ex Bak. in Oliv. Fl. Trop. Afr. 2: 187. 1871; Bak. f. Leg. Trop. Afr. 381. 1929.

Mucuna erecta Bak. Kew Bull. 1895: 65. 1895; Bak. f. Leg. Trop. Afr. 381. 1929.

Kota-kota District: Nchisi Mountain, occasional in *Brachystegia* woodland, shrub about 1 m. high, branches weak, not climbing, leaves greyish, flowers bronze-green, 1350 m., Aug. 1, 1946, *17079*. Ubangi-Shari, British and French Cameroons, Belgian Congo, Uganda, Kenya, Tanganyika Territory, Nyasaland, N. Rhodesia, and Angola.

Physostigma mesoponticum Taub. Ber. Deutsch. Bot. Ges. 12: 81. 1894; Bak. f. Leg. Trop. Afr. 386. 1929; Milne-Redhead, Hook. Ic. Pl. 33: *pl. 3214*. 1933.

Kota-kota District: Kota-kota, bare places in grass country, shrub 90–120 cm. high, flowers purple, 460 m., Aug. 7, 1946, *Shortridge 17392*. Chia area, occasional in sandy woodlands and lake-plain, shrub 50–80 cm. high, stems numerous, young, usually leafless shoots flowering after grass is burned, flowers pink, 480 m., Sept. 3, 1946, *17515*. Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. Rhodesia, and Angola.

Vigna nilotica (Del.) Hook. f. Niger Fl. 311. 1849; Bak. f. Leg. Trop. Afr. 404. 1929.

Dolichos niloticus Del. Fl. Égypte 253. *pl. 38.* 1812.

Kota-kota District: Benga, Lake Nyasa, plentiful on sandy lake-shores, vine 1–2 m., flowers yellow, 470 m., Sept. 2, 1946, *17484*. Egypt and Syria, southwards through east Africa to Portuguese East Africa, Nyasaland, and possibly N. Rhodesia.

I am very indebted to my colleague Mr. R. B. Drummond for giving me the correct name for this plant.

Vigna dekindtiana Harms, Bot. Jahrb. **30**: 93. 1901; Bak. f. Leg. Trop. Afr. 407. 1929.

Zomba District: Zomba, in *Brachystegia* woodlands on mountain slopes, not common, small trailing vine, more or less scabrid, flowers purple, rather showy, 1100 m., May 26, 1946, *16028**. Zomba Plateau, twining in tall grass, vine about 1 m. high, flowers bluish-purple, conspicuous, 1400 m., June 11, 1946, *16331*. Cholo District: Cholo Mountain, occasional in rain-forest regrowths, vine 3 m. high, flowers purple, standard brown below, 1200 m., Sept. 22, 1946, *17735*. Probably widely distributed in tropical Africa.

This is what has been called the wild form in Africa of the cow pea, *Vigna unguiculata* (L.) Walp. [*V. sinensis* (L.) Savi ex Hassk., *V. catjang* (L.) Walp.]. This is the view of C. V. Piper (U. S. Dep. Agr. Bur. Pl. Ind. Circ. **124**: 32. 1913; U. S. Dep. Agr. Bur. Pl. Ind. Bull. **229**. 1912) and Harms [in Engl. Pflanzenw. Afr. 3(1): 687. 1915]. This may well be true, but on account of the narrow dehiscent pods of *V. dekindtiana,* I feel that it is better kept as a distinct species.

I thought that the correct name for *V. dekindtiana* might prove to be *V. alba* (Don) Planch. ex Bak. f., described from S. Tomé. The type, at the British Museum (Natural History), lacks flowers, but there are other later specimens—*G. Watt 7096, Exell 43, 52*—of what is no doubt the same species, also from S. Tomé. These have small flowers 17–19 mm. long and very small calyces 4–5 mm. long, including the 1.5–2 mm.-long teeth. Although *V. alba* is probably not endemic to S. Tomé, I feel it better at present to keep it separate from the large-flowered *V. dekindtiana*, although later research may show that the differences are only varietal.

Another source of trouble is the South African *Vigna triloba* Walp. (*Dolichos trilobus* Thunb. non L.) This also is I think at present to be kept apart from *V. dekindtiana*, though I am anything but confident about it. Exell (Cat. Vasc. Pl. S. Tomé, 163. 1944) was uncertain whether *V. triloba* and *V. alba* were or were not conspecific.

This complex of species urgently requires critical revision.

Vigna ? gazensis Bak. f. Leg. Trop. Afr. 409. 1929.

Mlanje District: Mlanje Mountain, southwest ridge, in rocky grassland, vine trailing in grass, flowers purple, 2120 m., June 28, 1946, *16509*; Luchenya Plateau, twining on brushy growths in a forest-clearing, vine, flowers purple, 1890 m., July 12, 1946, *16803*. S. Rhodesia and ? Nyasaland.

More material, including fruits, is wanted from both countries before the identity of the Nyasaland plant can be really certain. A specimen in Herb. Kew. *(Purves 60*, Mlanje Mountain, Tuchila Plateau, 1830 m., Aug. 1901, a blue-flowered climber) is clearly the same species as the plants collected by Mr. Brass.

Vigna nuda N. E. Br. Kew Bull. 1901: 121. 1901; Bak f. Leg. Trop. Afr. 415. 1929; Milne-Redhead, Hook. Ic. Pl. **33**: *pl. 3213*, 1933.

Dedza District: Dedza, sporadic in *Brachystegia* woodland, training vine, young shoots flowering after burning of the grass, rootstock woody, flowers purple, showy, 1500 m., Sept. 13, 1946, *17629*. Belgian Congo, N. and S. Rhodesia, and now new to Nyasaland.

Vigna esculenta (De Wild.) De Wild. ex Dur. Syll. Fl. Congo. 151. 1909; Bak. f. Leg. Trop. Afr. 415. 1929.

Liebrechtsia esculenta De Wild. Ann. Mus. Congo Bot. IV. 74. *pl. 25, f.1-10.* 1902.

Kasungu District: Kasungu, one example in *Brachystegia* woodland, vine climbing to 3 m., deciduous, leafless, twining, flowers purple, 1000 m., Aug. 27, 1946, *17438*. Belgian Congo, N. and S. Rhodesia, and now new to Nyasaland.

Psophocarpus palustris Desv. Ann. Sci. Nat. 9: 420. 1826; Bak. f. Leg. Trop. Afr. 426. 1929.

Chikwawa District: Lower Mwanza River, occasional on sandy beaches, trailing vine, flowers blue, 180 m., Oct. 6, 1946, *18005*. Widespread in tropical Africa, also in Madagascar, the Mascarenes, and tropical Asia; it occurs in Brazil but is probably not native.

Dolichos L. Blue- or purple-flowered species.

Dolichos formosus Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 223. 1847; Bak. f. Leg. Trop. Afr. 448. 1929.

Dolichos shuterioides Bak. Kew Bull. 1897: 262. 1897; Bak. f. Leg. Trop. Afr. 449. 1929.

Rhynchosia sphaerocephala Bak. Kew Bull. 1897: 264. 1897.

Kota-kota District: Nchisi Mountain, common in shrubberies bordering lower montane forest, vine 2 m. high, flowers purple, later blue, 1600 m., July 26, 1946, *16956*. Cholo District: Cholo Mountain, plentiful in rain-forest regrowths, shrub 2-3 m. high, flowers violet, 1200 m., Sept. 25, 1946, *17809*. Eritrea and Abyssinia, southwards to Nyasaland and S. Rhodesia; also in the Belgian Congo.

Dolichos L. Climbing or trailing species with creamy, yellow, or greenish flowers.

A few of Mr. Brass' gatherings belong to this group. The name *D. biflorus* L. has been freely used by botanists for various plants with creamy, yellow, or greenish flowers, and so indiscriminately that I found it impossible to name Mr. Brass' plants satisfactorily until I had tried to reclassify the whole group. As a result I am putting forward the following very tentative scheme.

The pods are of the greatest importance, and must be seen in order to gain a clear idea of the species. Realising, however, that many herbarium specimens lack pods, I have tried to construct an alternative key to cope with this.

To give a complete enumeration of all the specimens that I have seen for every species would consume too much space here, so I have usually contented myself with merely a selection, all unless it is otherwise stated to be found in the Kew Herbarium. I am greatly indebted to Prof. Dr. R. E. G. Pichi-Sermolli, Istituto Botânico, Florence, for sending me various specimens on loan from the Herbarium Universitatis Florentinae, including the type of *D. benadirianus* Chiov.

Key to Plants bearing both Pods and Flowers

Pods 3-5.5 mm. wide:
  Pods long and very narrow, 4-8 cm. long, 2-3.5 m. wide; slender climbing herb, annual or sometimes perennial; leaflets ovate-oblong to narrowly oblong or lanceolate; flowers yellow, 6-11 mm. long; calyx-teeth subulate-lanceolate, lower 5-7 mm. long. 10. *D. stenophyllus*.

Pods broader, 3.5–5 mm. wide, short or long.

Pods normally distinctly falcate towards apex, their sides pubescent with a mixture of very short and much longer silky hairs, or else glabrous; flowers small, 7–11 mm. long.

Calyx-teeth all 1–2 mm. long; tertiary venation on lower side of leaflets raised; very slender annual herb, green and glabrescent, with small cream to greenish-yellow flowers 9–11 mm. long. 4. *D. sp.*

Lower calyx-tooth 4–6 mm. long; tertiary venation on lower side of leaflets not raised; a slender climbing herb, ± pubescent or sometimes subglabrous; leaflets mostly short, ovate to obovate, obtuse or rounded rarely subacute at apex; flowers small, cream to yellow, 7–10(–11) mm. long. 2b. *D. uniflorus* var. *stenocarpus.*

Pods straight or almost so, glabrous or very shortly pubescent; flowers medium, 12–15 mm. long when expanded.

Petioles short, 0.5–1.5(–2.3) cm.; leaflets small, 1–4 cm. long, variable in shape, usually rounded at apex; prostrate or rarely climbing herb; calyx 5–9 mm. long, teeth narrowly triangular to subulate, 3–7 mm. long; flowers pale yellow or cream; pod 2.2–4 cm. long, 3.5–4.5 mm. wide. 8. *D. chrysanthus.*

Petioles long, 3 cm. or more; leaflets larger, mostly 4–6 cm. long, elliptic to oblong; calyx 5–6 mm. long, teeth triangular, 2–4 mm. long [if calyx-teeth elongate 4–6 mm. long with subulate-filiform points, then see 9, *D. brevicaulis* Bak.]; flowers greenish to cream; pod 6–7 cm. long, 5 mm. wide. 7. *D. oliganthus.*

Pods (5–)6–8.5 mm. wide.

Lower paired stipels on each leaf 4–8 mm. long, usually twice as long as the lateral petiolules, brown; flowers medium, 12–15 mm. long when expanded.

Pods short, 2.5–3.5 cm. long, very shortly pointed at base and apex; leaflets mostly obtusely pointed or rarely subacute, with an apical mucro 0.5–1 mm. long, elliptic to lanceolate, rather strongly trinerved at base. 6. *D. taubertii.*

Pods much longer, 5–6 cm. long, attenuate at base and apex; leaflets all obovate, rounded at apex, with apical mucro 1–3 mm. long but sometimes less. 5. *D. rupestris.*

Lower paired stipels on each leaf 1–3(–4) mm. long, not as much as twice as long as the lateral petiolules, filiform.

Lower and lateral sepals quickly attenuate into long filiform points two to several times longer than the expanded basal part of the teeth; flowers pale to greenish-yellow.

Flowers small, up to 10 mm. long, rarely as much as 12–13 mm.; slender herbs, probably always annual; leaflets ovate; pods slightly but distinctly falcate.

Pods (under a lens) densely clothed on sides with very fine non-tubercle-based hairs; only a rare introduction in Africa. 2a. *D. uniflorus* var. *uniflorus.*

Pods (under a lens) rather sparsely clothed on sides with stiffer, fragile, setiform, tubercle-based hairs, with an "under-storey" of minute hairs; sepals with longer filiform points than last. 3. *D. daltoni.*

Flowers medium to large, 13–18 mm. long; flowering shoots erect, later producing trailing lateral shoots; leaflets obovate, drying greyish; pods (only immature pods known) about 6 mm. wide. 9. *D. brevicaulis.*

Lower and lateral sepals acuminate, not filiform-pointed, acumen up to 1½ times as long as expanded basal part of teeth; perennials, often with thinly woody stems; flowers medium to large, 12–24 mm. long.

Stems with usually sparse sometimes dense appressed pubescence [intermediates occur between this and 1a, var. *axillaris*]; flowers 13–20 mm. long; fruits usually rather long-beaked, beak about 5–15 mm. long. 1c. *D. axillaris* var. *glaber.*

Stems with dense spreading pubescence; fruits pubescent, usually with short beaks 3–5(–7) mm. long.

Flowers medium, 12–15 mm. long; calyx 4–7 mm. long. 1a. *D. axillaris* var. *axillaris.*

Flowers large, 15–24 mm. long; calyx 7–12 mm. long. 1b. *D. axillaris* var. *macranthus.*

Key to Plants lacking Pods

Lower paired stipels on each leaf 4–8 mm. long, often, but not always, twice as long as the lateral petiolules, brown; flowers medium, 12–15 mm. long when expanded.

Leaflets all obovate, rounded at apex, with an apical mucro usually 1–3 mm. long but sometimes less. 5. *D. rupestris.*

Leaflets mostly elliptic to lanceolate, obtusely pointed or rarely subacute at apex, with an apical mucro 0.5–1 mm. long, rather strongly trinerved at base; leaflets conspicuously margined with short white pubescence (if not so then compare no. 7). 6. *D. taubertii.*

Lower paired stipels on each leaf 1–3(–4) mm. long, not as much as twice as long as the lateral petiolules, filiform.

Flowers small, about 6–11 mm. long when expanded.

Calyx-teeth 1–2 mm. long; plant green and glabrescent; tertiary venation on lower side of leaflets raised. 4. *D. sp.*

Calyx-teeth 3 mm. long or more, rarely only 2 mm. and then plant densely pubescent without raised tertiary venation on lower side of leaves.

Upper and lateral calyx-teeth quickly attenuate into long filiform points 4–6 mm. long and two to several times as long as the expanded basal part of the teeth.

Leaflets puberulous above with short hairs, narrow, oblong to lanceolate, tending to be parallel-sided. 10. *D. stenophyllus.*

Leaflets with numerous much longer hairs above, mostly ovate to elliptic.

Calyx-teeth conspicuously long-filiform; native plant. 3. *D. daltoni.*

Calyx-teeth less attenuate; introduced only. 2a. *D. uniflorus* var. *uniflorus.*

Calyx-teeth acute or acuminate, not or only shortly filiform-pointed, acumen up to 2–4 mm. long and up to 1½ times as long as the broadened basal part of the teeth.

Leaflets mostly narrow, oblong to lanceolate, tending to be parallel-sided, hairs on upper surface short. 10. *D. stenophyllus.*

Leaflets mostly broad, ovate to obovate or broadly elliptic, not in the least parallel-sided, hairs on upper surface mostly longer than last. 2a & 2b. *D. uniflorus* var. *uniflorus.* (introduced in Africa) and var. *stenocarpus* (native); the vars. not safely distinguishable without fruits.

Flowers medium to large, 12–24 mm. long.

Plants climbing or twining; stems becoming thinly woody; leaflets mostly ovate, narrowed to a blunt or obtuse apex, variable in size, mostly less than 4 cm. long, venation beneath not raised.

Upper and lateral calyx-teeth quickly attenuate into long filiform points 4–6 mm. long and 2–several times as long as the expanded basal part of the teeth. 3. *D. daltoni.*

Calyx-teeth acute or acuminate, not or only shortly filiform-pointed, acumen 2–4 mm. long and up to 1½ times as long as the expanded basal part of the teeth.

Stems with usually sparse sometimes dense appressed pubescence [intermediates occur between this and 1a, var. *axillaris*]; flowers 13–20 mm. long; fruits usually rather long-beaked, beak about 5–15 mm. long. 1c. *D. axillaris* var. *glaber.*

Stems with dense spreading pubescence; fruits pubescent, usually with short beaks 3–5(–7) mm. long.

Flowers medium, 12–15 mm. long; calyx 4–7 mm. long. 1a. *D. axillaris* var. *axillaris.*

Flowers large, 15–24 mm. long; calyx 7–12 mm. long. 1b. *D. axillaris* var. *macranthus.*

Plants prostrate or rarely climbing, usually herbaceous; leaflets with venation raised beneath and very commonly rounded at apex.

Petioles short, 0.5–1.5(–2.3) cm.; leaflets small, 1–4 cm. long, variable in shape, usually rounded at apex; flowering shoots prostrate or twining; calyx 5–9 mm. long, teeth narrowly triangular to subulate, 3–7 mm. long. 8. *D. chrysanthus.*

Petioles long, (2–)3 cm. or more; leaflets larger, mostly 4–6 cm. long, elliptic to oblong or obovate (sometimes leaflets smaller, but then flowering shoots erect).
  Calyx 5–6 mm. long, teeth triangular, 2–4 mm. long; leaflets mostly elliptic to oblong. 7. *D. oliganthus.*
  Calyx 7–9 mm. long, teeth 4–6 mm. long, quickly narrowed into long subulate-filiform points; leaflets mostly obovate to oblanceolate, drying a characteristic greyish tint. 9. *D. brevicaulis.*

In the following account the species and varieties not represented in Mr. Brass' collection are enclosed in brackets.

[**1a. Dolichos axillaris** E. Mey. Comm. Pl. Afr. Austr. 1: 144 (1835–36) var. **axillaris.**

Harms (Bot. Jahrb. 26: 312, 313. 1899) discusses the concept of *Dolichos biflorus* at some length, and concludes that *D. axillaris* E. Mey. is a synonym of *D. biflorus*—a conclusion since generally accepted, although, I am convinced, incorrect.

D. axillaris in its wide sense is the commonest of the African species in the "*D. biflorus*" complex. It is normally recognisable without difficulty by its large flowers 12 mm. or more long, by its perennial climbing habit, short stipels, shortly acuminate sepals and broad pods 6–8.5 mm. wide.

Typical *D. axillaris* is found in Nigeria (*Lely 578*), Belgian Congo (*Lebrun 9743*), Eritrea (*Pappi 4715*, Herb. Florent.), Abyssinia (*Cufodontis 568*, Herb. Florent.), Uganda (*Maitland 109, Chandler 1382, Purseglove 583, 3044*), Kenya (*Mrs. Brodhurst-Hill 485*), Tanganyika Territory (*St. Clair-Thompson 746, Gillman 510*), Angola (*Pearson 2238*), Natal (*Drege s.n., Rudatis 636*). It is also found in Madagascar (*Lyall 118, Baron 892*).]

1b. Dolichos axillaris E. Mey. var. **macranthus** Brenan, var. nov.

A *D. axillari* typico, cujus caules patentim vel subdeflexe pubescentes praebet, floribus majoribus, calyce 7–12 mm. longo, corollis 15–24 mm. longis differt.

NYASALAND: North Nyasa District: Nyika Plateau, 1830–2130 m., 1896, *A. Whyte* 213 (Herb. Kew.); ibid., between Mpata and the commencement of the Tanganyika Plateau, 610–910 m., July 1896, *A. Whyte s.n.* (Herb. Kew.). Blantyre District: Blantyre, trailing in old gardens, flowers green, 1100 m., June 18, 1946, *16362*. Kota-kota District: Nchisi Mountain, twining on brushy growth edging rain-forest, vine 1.5 m. high, flowers green, inconspicuous, 1400 m., Aug. 2, 1946, *17108*; ibid., twining in shrubberies bordering rain-forest, vine 2 m. high, flowers green, fruit immature, 1400 m., Sept. 11, 1946, *17621*. Cholo District: Cholo Mountain, frequent in rain-forest regrowths, shrub 1–2 m. high, flowers green, 1200 m., Sept. 28, 1946, *17856*.

SOUTHERN RHODESIA: Umtali District: Odzani River valley, Manica District, 1914, *A. J. Teague 90* (TYPUS varietatis in Herb. Kew.).

This appears to be merely a large-flowered variant of var. *axillaris.*

[**1c. Dolichos axillaris** E. Mey. var. **glaber** E. Mey. Comm. Pl. Afr. Austr. 1: 144. 1835–36.

Clitoria viridiflora Bout. Hook. Ic. Pl. *pl. 152.* 1837.

Dolichos uniflorus Lam. var. *glaber* Thwaites ex Trim. Hand-Book Fl. Ceyl. 2: 76. 1894.

This variety appears to be rather commoner and more widespread than var. *axillaris.* It varies in indumentum; in the size of the leaflets; in the size of the flowers, which may be as small as in var. *axillaris* or as large as in var. *macranthus,* but whose variation seems quite uncorrelated with geography; and in the pods, which may be hairy or puberulous.

The var. *glaber* is found in the Belgian Congo (*Lebrun 8545, Ghesquière 6564*), Eritrea (*Schweinfurth & Riva 2212, Pappi 373,* Herb. Kew., *Terraciano & Pappi 510, Fiori 1158, 1159, Pappi 5391, 5461,* Herb. Florent.), Abyssinia (*Schimper 508, Gillett 5273,* Herb.

Kew., *Ruspoli & Riva 1350, Aristocle Vàtova 1064, Pietro Benedetto 271, 572,* Herb. Florent.), Somaliland (*Paoli 1234, 1295,* Herb. Florent.), Uganda *(Chandler 1023),* Kenya *(Major & Mrs. Lugard 501, H. M. Gardner 3734, Mrs. Tweedie 402),* Tanganyika Territory *(Miss E. M. Bruce 21),* Zanzibar (*K. E. Toms 206, Greenway 1147*), Pemba (*J. H. Vaughan 524),* Portuguese East Africa *(Gomese Sousa 782, Mrs. H. G. Faulkner No. (Pretoria) 84),* S. Rhodesia *(A. Hislop 44),* N. Rhodesia (Fwambo, *Carson s.n.* ?), Transvaal *(F. A. Rogers 18171),* Natal *(Drège s.n., Medley Wood 906, Rudatis 946).*

Outside continental Africa, var. *glaber* is found in Madagascar *(Hildebrandt 3132, Scott Elliot 2466, Grevè 292),* Mauritius *(Bouton s.n., Telfair s.n.)* and Ceylon *(Ferguson s.n., Thwaites 1475).*

In Africa certain plants occur having the indumentum sparse as in var. *glaber* but spreading. Their aspect is intermediate between var. *glaber* and var. *axillaris,* and they are one of the reasons why I feel that varietal rank in here correct. These intermediates occur in Nigeria *(Lely P. 97),* Kenya *(Miss E. R. Napier 2434),* and Tanganyika Territory *(Schlieben 904, G. B. Wallace 695, Greenway 4155).*]

[**2a. Dolichos uniflorus** Lam. Encyc. 2: 299 (1786) var. **uniflorus**; DC. Prodr. 2: 398. 1825.

Dolichos biflorus sensu Murr. Syst. Nat. ed. 13. 548. 1774, pro parte, quoad synonymum Plukenetianum tantum; et auctorum recentiorum plurimorum praesertim asiaticorum, saepe pro parte; non L. Sp. Pl. 727. 1753.

The name *Dolichos biflorus* L. must unfortunately be rejected altogether, and the plant bearing this name, so commonly cultivated in India, must assume its other well-known name *Dolichos uniflorus* Lam. I must now give the evidence for these statements.

Linnaeus (Sp. Pl. 727. 1753) diagnosed *D. biflorus* in the following words: "12. Dolichos caule perenni laevi, pedunculis bifloris, leguminibus erectis. *Roy. lugdb.* 368. *Habitat* in India." He placed *D. biflorus* in the group of species * *Erecti.*

Linnaeus' original account remained neither added to nor altered until Syst. Nat. ed. 12. **2**: 484 (1767).

Linnaeus' reference "*Roy. lugdb.* 368" is to Adrian van Royen, Fl. Leydensis Prodromus, 368. 1740. Royen there gave the identical descriptive phrases repeated later by Linnaeus, adding "*Crescit* in India Orientali."

In the Linnaean herbarium there is no specimen of *Dolichos biflorus,* according to Savage (Cat. Linn. Herb. 127. 1945).

Dolichos biflorus L. is thus based entirely and exclusively on the reference to van Royen's earlier work.

The next step in the investigation was to find whether van Royen's own herbarium could help. In answer to a request for early specimens of *Dolichos biflorus,* the authorities of the Rijksherbarium at Leiden kindly sent on loan three specimens:

1) From van Royen's herbarium, bearing a label in David van Royen's hand saying "Dolichos biflorus L. Sp. 2. 1023" (The reference is to the second edition (1763) of the Species Plantarum); also two copies of an old label saying "$\frac{229}{36}$ Phaseolus indicus siliqua prorsum vigente, flore extus albo intus pallide violaceo, semine candido." I cannot find the origin of this last descriptive sentence. It is not mentioned either in the Fl. Leydensis Prodromus itself, or in the first edition of the *Species plantarum,* or in Plukenet's *Almagestum botanicum* or his other works.

2) From Meerburgh's herbarium, bearing one label saying "Dolichos biflorus," and another saying "Dolichos 5 prod [D.]—biflorus Linn Sp: (2) pag 1023 num 25."

3) Also from Meerburgh's herbarium, bearing a label saying "Dolichos kolii [or kolü] Linn Sp Plukn Alm: 290 pl 10." I cannot make much of this, except that the Plukenet reference is probably to "Phaseolus hirsutus flexicaulis Mungo affinis è Maderaspatan caule tereti; sub nomine Colüe recepi" (Pluk. Almag. Bot. 290). This is said to be a synonym of *Phaseolus mungo* L. Mant. Pl. 101 (1767).

Sheets 1) and 2) are unquestionably *Vigna unguiculata* (L.) Walp.; 3) is *Dolichos uniflorus* Lam.

In the descriptive sentence used by van Royen and Linnaeus for *D. biflorus*, taking into account the * *Erecti* in which Linnaeus placed the species, the erect smooth stems and the pedunculate flowers do not apply to any plant which later authors have put under *Dolichos biflorus* in its widest sense. On the other hand the descriptive sentence referred to fits well *Vigna unguiculata* and the specimens of van Royen and Meerburgh.

David van Royen died in 1799, and must have written the label on sheet 1) sometime after 1763. Meerburgh's works were published between 1775 and 1798, and the labels on his specimens appear contemporary. There is thus strong evidence that at that time at Leiden the name *Dolichos biflorus* was being applied to *Vigna unguiculata*, and that the plant which subsequently became known as *D. biflorus* was called a different name, *"Dolichos kolii."* The name *D. biflorus* was only written on specimen 3) quite recently.

So far there is no evidence at all that *Dolichos biflorus* (i.e. *Vigna unguiculata*) and *D. uniflorus* were anything but clearly distinguished from each other. The trouble seems to date from Murray's thirteenth edition of the *Systema naturae* (1774), for on p. 548 he adds as a synonym of *Dolichos biflorus* "Phaseolus vulgaris lablab effigie, flore parvo ochroleuco, siliquis falcatis gemellis. Pluk. alm. 291. t.213. f.4." The plant described and figured by Plukenet is clearly *Dolichos uniflorus* and not *Vigna unguiculata*. Since then *Dolichos biflorus* has been generally applied to *D. uniflorus* or related species of *Dolichos*, and not at all to *Vigna unguiculata*.

Fortunately *Vigna unguiculata* (L.) Walp. is based on *Dolichos unguiculatus*, published in 1753, at the same time as *D. biflorus*, so that the latter merely becomes a synonym of *V. unguiculata*.

I propose that the specimen in van Royen's herbarium, labelled *Dolichos biflorus* by David van Royen, the first of the three specimens referred to already, be taken as the type of *Dolichos biflorus* L.

The authorities of the Muséum National d'Histoire Naturelle at Paris very kindly sent on loan a fragment of the type of *D. uniflorus* Lam. ("De M. Sonnerat au Jardin R."), showing stems, leaves and flowers; also a tracing of the pods, showing them clearly falcate and 6 mm. wide. There can I think be no reasonable doubt that *D. uniflorus* Lam. has been correctly interpreted as the commonly cultivated horse gram of India, from whose axils single flowers often arise as they do in Lamarck's type. The calyx-segments are shorter than those of *D. daltoni*.

The only African gathering that agrees with the Indian plant is *Snowden 1826* from Kampala in Uganda, where it was said to be an introduction cultivated as a cover-crop.

The following variety is however no doubt native in Africa.]

[2b. **Dolichos uniflorus Lam. var. stenocarpus Brenan, var. nov.**

Leguminibus angustioribus 4–5.5 mm. (nec. 6–8 mm.) latis differt.

Dolichos benadirianus Chiov. Ann. Bot. Roma **13**:385. 1915; Bak. f. Leg. Trop. Afr. 448. 1929.

INDIA: Punjab: Simla, Hiya Khud, 5th waterfall, 1520 m., Sept. 1, 1885, *H. Collett 596*. Central Provinces: Pachmarki, wild in woods remote from cultivation, Oct. 9, 1901, *H. H. Haines 173P*. Khairagarh State, Kahuapani, climbing among bushes up to 1.2 m., not far from fields, Oct. 20, 1943, *H. F. Mooney 2364*. Barogh, Oct. 15, 1916, *H. H. Rich 409*.

SOMALILAND: Benadir, 1912, *Capt. F. Provenzale s.n.* (typus *D. benadiriani* in Herb. Florent.). Dune di Merca, Aug. 16, 1937, *Senni 1223* (Herb. Florent.). Ras Sif presso Mogadiscio, "scogli e sabbie sulla riva del mare," Feb. 12, 1924, *Puccioni & Stefanini 71* (Herb. Florent.)—a rather doubtful specimen, agreeing with *D. uniflorus* var. *stenocarpus* except for one exceptionally large vexillum about 15 mm. long; the plant is very atypical and diseased, and there are numerous black fungal marks on the large vexillum, whose development may well be pathological.

KENYA: Central Province, Machakos District: Makueni, in cleared bush country, 1220 m., Oct. 16, 1947, *H. Bogdan AB 1350*. Coast Province, Teita District: Voi, hillside, twining herb, cream flowers, 640 m., May 8, 1931, *Miss. E. R. Napier 1011*. Kilifi District: Mida, in open mriti forest, small prostrate herb, flowers creamy and yellow, *R. M. Graham A 50;* Mufumbini, June 21, 1945, *G. M. Jeffery K 234;* Malindi, occasional on sand-dunes, prostrate perennial herb, flowers yellow, Aug. 13, 1949, *A. Bogdan 2578;* Muka, June 3, 1902, *T. Kaessner 905*.

TANGANYIKA TERRITORY: Lake Province, Shinyanga District: Shinyanga, margins of small thickets on granite hills, rambling climber, frequent, 1100 m., May 25, 1931, *Burtt 2444*. Tanga Province, Tanga District: Moa, 1893, *Holst 3030*. Pangani District: Bushiri Estate, found on clifftop, plants spreading among grass, flowers dull creamy-yellow, Oct. 1, 1950, *H. G. Faulkner 686*; found in sandy soil close to tidal river, a trailing, twining plant, common among grass, flowers creamy-yellow, Nov. 14, 1950, *H. G. Faulkner 706;* sandy soil, among grass, spreading and twining plant, abundant in places, flowers creamy-green with maroon markings, Dec. 21, 1950, *H. G. Faulkner 759*. Eastern Province, Mohonyera, 6° 55' S. 38° 30' E., Oct. 1860, *Speke & Grant s.n.* Uzaramo District: Usaramo, between Mapinga and Kunduchi (locality no. 0, 3, 229), flowers yellowish-white, Dec. 12, 1915, *A. Peter K 546*. Central Province, Kondoa District: Kondoa-Irangi, climbing, flowers yellow, ca. 1600 m., Aug. 27, 1932, *Geilinger 1651*.

PORTUGUESE EAST AFRICA: Manica e Sofala Province. Kongone mouth of Zambezi, Jan. 1861, *Kirk s.n.* Inhambane Province: Salela near Inhambane, sandy soil, flowers yellow, 50 m., *Gomes e Sousa 1637*.

TRANSVAAL. Barberton Division: Crocodile Gorge, climbing over rocks, Apr. 1920, *F. A. Rogers R. 23966* (TYPUS varietatis in Herb. Kew.).

The African specimens of this variety tend to have shorter calyx-teeth (longest one 3–5 mm.) than those of *D. uniflorus* var. *uniflorus* (4–8 mm.); but in the Indian specimens no such difference is to be seen. *D. benadirianus* Chiov., of which I have examined the type, is conspecific.]

[3. **Dolichos daltoni** Webb in Hook. Niger Fl. 125. 1849.

I feel uncertain whether it would not be more satisfactory to treat this as a variety of *D. uniflorus*, certainly *D. daltoni* and *D. uniflorus* var. *stenocarpus* are very easily and constantly separable from one another in Africa, but *D. uniflorus* var. *uniflorus* to some extent bridges the gap. However I cannot match the indumentum on the pod of *D. daltoni* in Indian *D. uniflorus*, and rely on this together with the more markedly filiform calyx-teeth to mark the species.

D. daltoni is found in the Cape Verde Islands *(J. D. Hooker 144, J. Cardoso 228)*, Nigeria (*Dalziel 45*), Eritrea (*Terraciano & Pappi 14, Tellini 121, 1526, 1582, 1608, Pappi 7438, 7540, 8558,* all in Herb. Florent.), Abyssinia *(Schimper 384, 460)*, Tanganyika Territory (*Hornby 266, Burtt 5199* in part, *D. P. Pielou 157*), Nyasaland *(Archdeacon W. P. Johnson 56)*, N. Rhodesia *(Miss A. E. Gairdner 496, 496a, Mrs. H. M. Richards 1105)*, and Angola *(Baum 774)*.]

[4. **Dolichos** sp.

None of the fruiting specimens of this at Kew bears flowers, and vice versa, so that there is some doubt about the interpretation of the species. The very tiny calyx is, however, most distinctive.

I have seen specimens from Nigeria *(Lely P. 800)*, Tanganyika Territory *(Lynes I. L. 250 m, Bax 141)*, N. Rhodesia *(F. A. Rogers 7104, J. D. Martin 596/33)*, and S. Rhodesia *(Herb. Dep. Agr. 1365)*.

Desmodium tenuiflorum Micheli ex Dur. & De Wild. (Bull. Soc. Bot. Belg. 36: 59. 1897; Ill. Fl. Congo 119, *pl. 60, f. 11.* 1899) is said by Baker f. (Leg. Trop. Afr. 448. 1929) to be a species of *Dolichos* near *D. baumannii* Harms. The illustration rather suggests the present species. *Desmodium tenuiflorum* was based on two sheets, both of which I have seen, thanks to the kindness and courtesy of Prof. Dr. W. Robyns, Director of the Jardin Botanique de l'État in Brussels; *Thonner 83* is a *Desmodium* which Dr. Bernice G. Schubert kindly informs me is *D. adscendens* (Sw.) DC.; while *Dupuis s.n.* is a species of *Galactia.* The name *Desmodium tenuiflorum* thus in no way applies to *Dolichos.*]

[5. **Dolichos rupestris** Welw. ex. Bak. in Oliv. Fl. Trop. Afr. 2: 212. 1871; Bak. f. Leg. Trop. Afr. 445. 1929.

Dolichos longistipellatus Harms, Bot. Jahrb. 26: 314. 1899; Bak. f. Leg. Trop. Afr. 445. 1929.

S. Rhodesia *(Eyles 2130, 7062),* Angola *(Welwitsch 2219, Gossweiler 3780).*]

[6. **Dolichos taubertii** Bak. f. Leg. Trop. Afr. 445. 1929.

Glycine maranguënsis Taub. in Engl. Pflanzenw. Ost-Afr. C: 220. 1895; non *Dolichos maranguënsis* Taub. in Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. 1891) 271. 1892.

Dolichos zanzibarensis Bak. f. Jour. Bot. 71: 342. 1933.

I have seen the type-number of this species *(Volkens 2121,* Kilimanjaro) in the British Museum Herbarium. Further good material, particularly of the fruit, is much wanted. It is found in Uganda *(Maitland 896, 995),* Kenya *(Miss E. R. Napier 1090, van Someren 289),* Tanganyika Territory *(Haarer 520, Burtt 2774, Rounce 53, Emson 368, Bally 2217),* and the Transvaal *(Rogers 20965).*

Dolichos zanzibarensis Bak. f., of which I have examined the type at the British Museum, I think is only a large-leaved form of *D. taubertii* and not a valid species.]

7. **Dolichos oliganthus** Brenan, sp. nov.

D. brevicauli Bak. ut videtur proxima, calycis dentibus brevioribus triangularibus differt; a *D. rupestri* Welw. ex Bak. leguminibus angustioribus 5 mm. tantum latis, stipellis brevioribus, foliolis apice non rotundatis differt; a *D. chrysantho* A. Chev. habitu, calyce, leguminibus longioribus longe distat.

Herba perennis, caules herbaceos ut videtur suberectos tum reptantes et usque ad 45 cm. longos 2 mm. crassos teretes pilis leviter deflexis vel raro appressis breviter sed dense pubescentes e caudice emittens. *Folia* trifoliolata; petioli (1.5–)3–6 cm. longi, tenues, pubescentes, supra canaliculati; stipulae ovatae usque oblongo-lanceolatae, costatae, acutae, 4–10 mm. longae, 2–4 mm. latae; foliola basi obtusa, apice obtusa vel subacuta, utrinque appresse pubescentia, costa nervisque lateralibus utrinque 5–10 supra inconspicuis vel prominulis subtus ut rete venularum prominulis vel prominentibus; foliolum terminale oblongum vel ellipticum, 3–8 cm. longum 0.9–3 cm. latum; foliola lateralia similia sed margine antico gibbosa, paulo latiora, 1–3 cm. lata; stipellae 2–3(–5) mm. longae, lineari-lanceolatae. *Inflorescentiae* axillares, sessiles vel subsessiles, 1–3-florae; pedicelli 3–5 mm. longi, pubescentes; bracteolae 2–3.5 mm. longae, lanceolatae, basi calycis positae. *Flores* quoad colorem collectoribus varie descripti : virides, viridi-lutei, pallide lutei, albi. *Calycis* tubus 3.5–4 mm. longus, obconicus, pubescens; dentes omnes pubescentes acuti; dens infimus anguste triangularis, 2.5–4 mm. longus, basi 1.25 mm. latus, paulum sursum curvatus; dentes 2 laterales anguste triangulares, 2–3 mm. longi, basi 1.5 mm. lati; dentes 2 superiores connatae, 2.5–4 mm. longae, basi 3.5 mm. latae, deltoideae. *Corolla:* vexillum obovato-orbiculare, apice emarginatum, 12–17 mm. longum, 9–15 mm.

latum, glabrum, medio intus supra basim callis 2 longitudinalibus elevatis circiter 4.5–6 mm. longis caelatum; alae basi cum carina coalitae, parte libera leviter acclivi 7 mm. longa, 2.25 mm. lata spathulari apice obtusa; carina 9 mm. longa, 3 mm. lata, sursum curvata, obtusa. *Stamina* monadelpha, vexillari 3 mm. supra basim tubi libera, filamento 4.5 mm. longo, staminibus aliis filamentis alternatim brevibus (1.5 mm.) et longioribus (2.5 mm.); antherae 0.75 mm. longae. *Ovarium* breviter et appresse puberulum, circiter 5 mm. longum. *Stylus* circiter 5 mm. longus, glaber, apice corona pilorum brevium coronatus. *Legumen* subrectum, glabrum vel fere glabrum, 5–8 cm. longum, 5 mm. latum, praesertim apicem versus gradatim attenuatum. *Semina* matura nondum visa.

NYASALAND: Blantyre District: Blantyre, in old gardens, flowers green, 1100 m., June 18, 1946, *16364* (TYPUS).

S. RHODESIA: Mazoe District: Mazoe, summit of Iron Mask Hill, flowers fleshy, green-yellow, 1680 m., Jan. 1915, *F. Eyles 603* (Herb. Kew., Herb. Mus. Brit.). Makoni District: Rusapi, received 1921, *A. Hislop Z. 242* (Herb. Kew.). S. Marandellas District: 1931, *Miss R. J. Myres 93* (Herb. Kew).

N. RHODESIA: Abercorn District: Chilongowelo, Victoria Falls, creeping on the ground in thick bush on loamy soil, stem woody, flowers on short pedicels, in threes, pale yellow, 1460 m., Mar. 16, 1952, *Mrs. H. M. Richards 1018* (Herb. Kew.). Ndola District: Mufulira, in *Brachystegia* woodland, drooping plant, flowers white, 1220 m., Mar. 14, 1948, *A. W. Cruse 198* (Herb. Kew.).

D. oliganthus seems closest to the Nigerian *D. brevicaulis*. Like that plant it seems to produce flowering shoots that at first are suberect; later, lateral trailing shoots appear. In habit it seems to stand midway between those species, such as *D. chrysanthus*, that produce only trailing or scandent shoots and those in which the stems are all and always erect.

[8. **Dolichos chrysanthus** A. Chev. Bull. Soc. Bot. Fr. 58(Mém. 8): 164. 1912; Bak. f. Leg. Trop. Afr. 449. 1929.

Dolichos biflorus L. var. *occidentalis* Harms, Bot. Jahrb. **26**: 313. 1899; Bak. f. Leg. Trop. Afr. 449. 1929.

The *Index kewensis* cites *Dolichos occidentalis* (Harms) Harms as having been published in Pflanzenw. Afr. **3** (1): 677 (1915), but my colleague Mr. H. K. Airy-Shaw informs me that the combination is not properly made there.

D. chrysanthus is without doubt specifically distinct from all forms of *D. uniflorus*. It is strange that Harms, while discussing his var. *occidentalis*, should not have realised how distinct the fruits were, and that they were correlated with well-marked vegetative characters.

The normally trailing habit, short petioles, small leaflets and comparatively large flowers, not to mention the pods, make *D. chrysanthus* readily recognisable. The leaflets vary in shape a good deal.

D. chrysanthus is known from Portuguese Guinea *(Espirito Santo 1439)*, the Ivory Coast *(Chevalier 22427)*, the Gold Coast *(T. Ll. Williams 390)*, Nigeria *(Barter 967, 1591, Lely 470, Dalziel 593)*, Ubangi-Shari *(Tisserant 2950)*, the French Cameroons *(Tessmann 2731)*, the Belgian Congo *(Quarré 2880)*, Anglo-Egyptian Sudan *(Schweinfurth 2251, 2375, Shantz 931, Myers 9314)*, and Angola *(Welwitsch 2209, 2210, Mrs. Faulkner A 197, A 457)*.]

I am grateful to the authorities of the Muséum National d'Histoire Naturelle at Paris for very kindly sending on loan the type of *D. chrysanthus* (*Chevalier 22427* from the Ivory Coast).

[9. **Dolichos brevicaulis** Bak. in Oliv. Fl. Trop. Afr. 2: 211. 1871; Bak. f. Leg. Trop. Afr. 444. 1929.

Confined, as far as is known, to Nigeria.

Dolichos baumannii Harms (Bot. Jahrb. 26: 313. 1899) is rather a problem. Hutchinson and Dalziel (Fl. W. Trop. Afr. 1: 410. 1928) make it a synonym of *D. biflorus* "L." However the size alone—12 mm. long or more—of the flowers of

D. baumannii makes that conclusion untenable. In many points the description of *D. baumannii* points to *D. chrysanthus*—notably the size of the leaves; but the calyx would be shorter than usual, and the colour rather suggests *D. brevicaulis*.

The type-collections of *D. baumannii* are now presumably destroyed and I think it best to leave it as a doubtful species until new collections have been made at the type-localities—Misahöhe and Bismarckburg in Togoland.]

[10. **Dolichos stenophyllus** Harms, Bot. Jahrb. 26: 314. 1899; Bak. f. Leg. Trop. Afr. 450. 1929.

The most remarkable features of this species are the very narrow elongate pods, the linear-lanceolate calyx-teeth, and the rather narrow leaves. When the plant is young the leaves may be broader, up to 6 × 2 cm.; the trailing lateral shoots seeming to bear the narrowest leaves.

The distribution is interesting: Togo *(Schroeder 90, 116)*, Nigeria *(Lely 562, P 697)*, the Belgian Congo *(Kaessner 2695)*, and Angola *(Gossweiler 11483)*. A specimen from Ubangi *(Tisserant 529)* is probably a variant of *D. stenophyllus* having the young pods long-hairy; ripe pods are lacking.]

Adendolichos punctatus (Micheli) Harms, Bot. Jahrb. 33: 180. 1902; Bak. f. Leg. Trop. Afr. 456. 1929.

Vigna punctata Micheli, Bull. Soc. Bot. Belg. 36(2): 62. 1897; Ann. Mus. Congo Bot. I. 1: 117. *pl.* 59. 1899.

Kota-kota District: Chia area, common on flood-banks of woodland streams, shrub 1–1.5 m. high, leaves greyish beneath, flowers white, calyx, pedicels, peduncles and pods viscid, 480 m., Sept. 3, 1946, *17507*. Dedza District: Dedza, frequent in *Brachystegia* woodland, shrub, young shoots flowering after burning of the grass, many shoots from a woody stock, flowers pink, under side of standard red, calyx viscid, 1500 m., Sept. 13, 1946, *17623*.

I name Mr. Brass' gatherings with some doubt, because the first five species of *Adenodolichos* enumerated in the *Leguminosae of tropical Africa* are separated by characters that, with the possible exception of the flower-colour, seem vague and unusable. There are not enough specimens at Kew to decide whether one or more species are involved.

Plants similar to those collected by Mr. Brass occur in the Belgian Congo, Tanganyika Territory, Portuguese East Africa and N. and S. Rhodesia, but this is the first record for Nyasaland.

Lablab vulgaris Savi, Osserv. Gen. *Phaseolus & Dolichos*, Mem. 2: 19. [Nuov. Gior. Litt. Pisa 7: 117.] ? 1824.

Dolichos lablab L. Sp. Pl. 725. 1753; Bak. f. Leg. Trop. Afr. 452. 1929.

Cholo District: Cholo Mountain, frequent in rain-forest regrowths, vine 2–3 m. high, flowers purplish-green, fruit immature, native name (Chinyanja) kankhungusa, 1200 m., Sept. 25, 1946, *17806*. Chikwawa District: Lower Mwanza River, occasional on sandy beaches, trailing or climbing, flowers blue, 180 m., Oct. 4, 1946, *17958*. Widespread and much cultivated in the warmer regions of the Old World. See note under *Abrus precatorius* L.

Rhynchosia albiflora[24] (Sims) Alston in Trimen, Fl. Ceylon 6: 85. 1931.

Cylista albiflora Sims, Bot. Mag. *pl. 1859*. 1816.
Cylista tomentosa Roxb. Cor. Pl. 3: 221. 1819.
Rhynchosia cyanosperma Benth. ex Bak. in Oliv. Fl. Trop. Afr. 2: 218. 1871; Bak. f. Leg. Trop. Afr. 469. 1929.

Kota-kota District: Nchisi Mountain, shrubby borders of rain forest, vine 3 m. high, brown-pubescent, flowers yellowish, heavily marked with red, 1650 m., July

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[24] *Rhynchosia* by R. D. Meikle, Royal Botanic Gardens, Kew.

31, 1946, *17051.* Cholo District: Cholo Mountain, rain-forest regrowths, twining vine 3 m. high, flower petals yellow and red, calyx green, 1200 m., Sept. 22, 1946, *17737.* Widely distributed through tropical Africa, also in the Mascarene Islands, India, and Ceylon.

Rhynchosia minima (L.) DC. Mém. Légum. 9: 363. 1825; Prodr. 2: 385. 1825; Bak. f. Leg. Trop. Afr. 471. 1929.

Dolichos minimus L. Sp. Pl. 726. 1753.

Chikwawa District: Chikwawa, one example in *Combretum* woodland, perennial herb, branches prostrate and ascending, flowers yellow streaked with red, 250 m., Oct. 5, 1946, *17980.* Widespread throughout the tropics of the New and Old Worlds.

The peduncles and rachides of the specimen examined are abnormally elongated, otherwise it agrees well with true *R. minima.* Much of the African material named *minima* must be considered distinct from the Linnaean species.

Rhynchosia resinosa (Hochst. ex A. Rich.) Bak. in Oliv. Fl. Trop. Afr. 2: 218. 1871; Bak. f. Leg. Trop. Afr. 480. 1929.

Fagelia resinosa Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 226. 1847.

Kasungu District: Kasungu Hill, one example on rocky slopes, shrub 1 m. high, loose, spreading, branchlets sometimes twining, calyx viscid, 1100 m., Aug. 28, 1946, *17454.* Frequent in East Africa from S. Rhodesia northward to Abyssinia, extending westward though N. Nigeria to French Guinea.

Rhynchosia nyikensis Bak. Kew Bull. 1897: 263. 1897; Bak. f. Leg. Trop. Afr. 481. 1929.

Kota-kota District: Nchisi Mountain, shrubberies bordering rain-forest, vine 2–3 m. high, inflorescence viscid with yellow glandular hairs, flowers yellow streaked with red, 1500 m., July 29, 1946, *17024.* Nyasaland and S. Tanganyika.

A shade form of this species with the leaves larger, thinner and less pubescent than those of the type. The very large bracts, which usually give the plant such a distinctive appearance, are early caducous, and almost absent from the specimen examined.

Rhynchosia clivorum S. Moore, Jour. Bot. 16: 131. 1878; Bak. f. Leg. Trop. Afr. 482. 1929.

Flemingia macrocalyx Bak. f. Trans. Linn. Soc. II. Bot. 4: 12. 1894.
Rhynchosia pycnantha Harms, Bot. Jahrb. 30: 332. 1901.

Kota-kota District: Nchisi Mountain, amongst rocks in *Brachystegia* woodland, shrub 1–1.5 m. high, flowers yellow, 1550 m., July 26, 1946, *16947.* The Transvaal and S. Rhodesia to Nyasaland and S. Tanganyika.

Rhynchosia clivorum S. Moore var. **caudata** Meikle, var. nov.

A typo differt foliis, caulibus, et pedunculis sparse villosis, foliis longe petiolatis, foliolis minus bullatis, racemis longe pedunculatis folia excedentibus, inflorescentiae bracteis longioribus, conspicuis, brunneis, acuminatis.

Mlanje District: Mlanje Mountain; Chambe Plateau, common in forest edges, shrub 2–3 m. high, flower yellow, 2000 m., July 9, 1946, *16767* (TYPUS varietatis).

Despite its distinct appearance, I am not satisfied that this specimen is specifically distinct from the variable *R. clivorum;* the sparse indumentum, long internodes, petioles, peduncles, and racemes all suggest growth in a shaded situation, and it is possible that increased illumination might cause the plant to revert to more normal *R. clivorum.* A fruiting specimen (*Wild 1457* in Herb. Kew.) from Inyanga, S. Rhodesia, may belong here, though certain determination is not possible in the absence of flowers. The S. Rhodesian plant has mottled seeds, whereas those of type *R. clivorum* are uniformly dark reddish-brown. Two other specimens in Herb. Kew. (*Eyles 3617*, S. Rhodesia, and *Hutchinson & Gillett 4369*, N. Transvaal) are intermediate in appearance between the type and var. *caudata*.

Rhynchosia clivorum S. Moore var. **fulvida** Meikle, var. nov.

A typo differt caulibus, stipulis, foliis et inflorescentiis breviter fulvo-villosis; foliis ellipticis vel ovato-lanceolatis, valde reticulatis; racemis congestis circiter 3.0 cm. longis, pedunculis brevibus; vexillum eleganter (in siccis) purpureo-striatum.

North Nyasa District: Nyika Plateau, shrubby borders of montane forest, shrub 2 m. high, flowers yellow, 2300 m., Aug. 13, 1946, *17205* (TYPUS varietatis).

This variety is probably identical with *Rhynchosia oreophila* Harms, described from material collected by Stolz (no. 2232) in the Kinga Mountains, S. Tanganyika. The type of this species is unfortunately not available for comparison, but the characters used in the original description to distinguish it from *Flemingia macrocalyx* Baker f. (=*R. clivorum* S. Moore) are, to my mind, scarcely sufficient to give it specific rank. The size and shape of leaves, length of racemes and size of individual flowers are all subject to considerable variation in *R. clivorum*, as in other species of *Rhynchosia*.

Rhynchosia insignis (O. Hoffm.) R. E. Fries, Schwed. Rhodesia-Kongo-Exped. 1911–1912 1: 95. 1914; Bak. f. Leg. Trop. Afr. 486. 1929.

Eriosema insigne O. Hoffm. Linnaea 43: 128. 1881.
Rhynchosia subaphylla Bak. f. Jour. Bot. 66(suppl. 1): 121. 1928; Leg. Trop. Afr. 486. 1929.

Kota-kota District: Nchisi, *Brachystegia* woodlands, shrub 20–30 cm. high, young shoots flowering a month after burning of the grass, flowers yellow, 1350 m., Sept. 8, 1946, *17572*;* Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb to 30 cm. high, young shoots flowering after burning of the grass, wings yellow, standard and keel brown, 1600 m., Sept. 9, 1946, *17594*. Recorded from Nyasaland, S. Rhodesia, N. Rhodesia, and Angola, apparently not uncommon in this area.

I have no hesitation in uniting *Rhynchosia subaphylla* Bak. f. with *R. insignis* (O. Hoffm.) R. E. Fries; the latter species frequently produces shoots with simple leaves, and the young leaves are just as silvery-tomentose below as those of *R. subaphylla*. The types of both species are from Malange, Angola.

Eriosema psoraleoides[25] (Lam.) G. Don, Gen. Syst. 2: 348. 1832.

Crotalaria psoraleoides Lam. Encyc. 2: 201. 1786.
Rhynchosia cajanoides Guill. & Perr. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 1: 215. 1832–33.
Eriosema cajanoides (Guill. & Perr.) Hook. f. in Hook. Niger Fl. 314. 1849.

Kota-kota District: Chia area, occasional on grassy alluvial flats, shrub about 1 m. high, leaves greyish below, flowers yellow, 480 m., Sept. 7, 1946, *17560*. Widely spread through tropical Africa, and in Madagascar.

Eriosema montanum Bak. f. Jour. Bot. 33: 142. 1895.

North Nyasa District: Nyika Plateau, Nchena-chena Spur, plentiful on shrubby grasslands, shrub 1 m. high, flowers yellow, 1900 m., Aug. 20, 1946, *17365*. Kenya and Uganda to Nyasaland and N. Rhodesia.

Eriosema affine De Wild. Ann. Mus. Congo. IV. 1: 200. 1903.

Kota-kota District: Nchisi Mountain, common in *Brachystegia* woodland, shrub 80–100 cm. high, leaves grey below, stems several, erect, little branched, flowers yellow, 1400 m., Aug. 2, 1946, *17111*. ? Kasungu District: North Road between Nzimba and Kasungu, frequent in *Brachystegia* woodland, shrub 1 m. high, flowers yellow, 1200 m., Aug. 23, 1946, *17383*. Kasungu District: Kasungu, common in *Brachystegia* woodlands, shrub 1–1.5 m. high, flowers yellow, 1000 m., Aug. 26, 1946, *17426*. Nyasaland to Angola, Katanga Province of the Belgian Congo to S. Rhodesia.

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[25] *Eriosema* by E. Milne-Redhead, Royal Botanic Gardens, Kew.

Eriosema englerianum Harms, Bot. Jahrb. 40: 41. 1907.

Kota-kota District: Chia area, common on grassy flood-banks of streams of dry lake-plain, shrub about 1 m. high, stems upright, usually simple, numerous, flowers yellow, 480 m., Sept. 5, 1946, *17538*. Katanga Province of the Belgian Congo to S. Rhodesia and Nyasaland.

Eriosema ellipticum Welw. ex Bak. in Oliv. Fl. Trop. Afr. 2: 227. 1871.

North Nyasa District: Nyika Plateau, Nchena-chena Spur, abundant on grasslands, shrub 1–1.5 m. high, leaves grey below, flowers yellow, showy, 1900 m., Aug. 20, 1946, *17350*; Nchena-chena, plentiful in *Brachystegia* woodlands, shrub 1–3 m. high, flowers yellow, conspicuous, 1340 m., Aug. 21, 1946, *17375*. Angola to southern Tanganyika and Nyasaland.

Flemingia[26] **grahamiana** Wight & Arn. Prodr. Fl. Penins. Ind. Or. 1: 242. 1834.

Flemingia rhodocarpa Bak. in Oliv. Fl. Trop. Afr. 2: 231. 1871; Bak. f. Leg. Trop. Afr. 514. 1929.

Kota-kota District: Nchisi Mountain, frequent in *Brachystegia* woodlands, shrub about 1 m. high, flowers greenish-white, usually sterile, 1400 m., July 27, 1946, *16988**. Chia area, common on grassy dry flood-banks of woodland streams, shrub 1 m. high, flowers greenish-white, fruit red, conspicuous, 480 m., Sept. 3, 1946, *17509*. Eastern and central tropical Africa from Abyssinia southward to the Transvaal and Natal, extending westwards into the Belgian Congo and the Shari; also in tropical Asia—Aden, southern India, and apparently China (Yunnan).

I agree with Burtt Davy (Man. Fl. Pl. Transvaal 414. 1932) in considering *F. rhodocarpa* and *F. grahamiana* as the same species. The identity of these two was first made known by Oliver in a paper by Dyer on the dye "waras" in Pharm. Jour. (31 May 1884).

Dalbergia melanoxylon Guill. & Perr. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 227. *pl. 53.* 1832–33; Bak. f. Leg. Trop. Afr. 520. 1929.

Chikwawa District: Chikwawa, locally abundant in dry stony woodland, the local "ebony," tree 6–8 m. high and about 10 cm. in diameter, flowers white, native name (Chinyanja) pingo, 200 m., Oct. 5, 1946, *17988*. Widespread in tropical Africa, extending southward to the Transvaal.

Dalbergia arbutifolia Bak. in Oliv. Fl. Trop. Afr. 2: 232. 1871; Bak. f. Leg. Trop. Afr. 522. 1929.

Chikwawa District: Lower Mwanza River, frequent on sandy river-banks, scandent shrub 8–10 m. high, flowers cream-coloured, 180 m., Oct. 6, 1946, *18009*. Tanganyika Territory, Portuguese East Africa, Nyasaland, and N. and S. Rhodesia.

Dalbergia lactea Vatke, Oesterr. Bot. Zeitschr. 29: 251. 1897; Bak. f. Leg. Trop. Afr. 525. 1929.

Mlanje District: Mlanje, frequent on termite mounds in *Brachystegia* woodland, tree 5–8 m. high, flowers purple, fruit very young, 750 m., Sept. 30, 1946, *17880*.

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[26] *Flemingia* Roxb. ex Ait. f. (1812) appears to be a later homonym of *Flemingia* Roxb. ex Rottl. (1803), which is said to be a synonym of *Thunbergia* Retz. There seems a good case for conserving the familiar *Flemingia* Roxb. ex Ait. f.

Anglo-Egyptian Sudan (Imatong Mountains) and Uganda, southward to Portuguese East Africa and S. Rhodesia; extending westward to the Gaboon.

Dalbergia nitidula Welw. ex Bak. in Oliv. Fl. Trop. Afr. 2: 235. 1871; Bak. f. Leg. Trop. Afr. 532. 1929.

Dalbergia mossambicensis Harms, Bot. Jahrb. 26: 295. 1899; Bak. f. Leg. Trop. Afr. 532. 1929.

Dalbergia swynnertonii Bak. f. Jour. Linn. Soc. Bot. 40: 60. 1911; Leg. Trop. Afr. 529. 1929.

Kota-kota District: Chia area, occasional in dry woodlands of lake-plain, tree 12–15 m. high and 25–30 cm. in diameter, semi-deciduous, flowers white, native name (Chinyanja) namasimba, 480 m., Sept. 4, 1946, *17531*; ibid., occasional in woodlands of dry lake-plain, tree 10 m. high, wholly or partly deciduous, flowers white, native name (Chinyanja) namasimba, 480 m., Sept. 6, 1946, *17553*. Belgian Congo, Uganda, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola.

Pterocarpus antunesii (Taub.) Harms, Bot. Jahrb. 30: 89. 1901; Bak. f., Leg. Trop. Afr. 540. 1929.

Calpurnia antunesii Taub. Bot. Jahrb. 23: 173. 1896.

Pterocarpus stevensonii Burtt Davy, Kew Bull. 1932: 262. 1932.

Chikwawa District: Chikwawa, common in dry brushy forest of elevated alluvial plain, tree 10–12 m. high, 200 m., Oct. 2, 1946, *17894*. Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola.

P. stevensonii seems merely a pubescent form of *P. antunesii*. *P. stevensonii* is recorded for Nyasaland in Burtt Davy & Hoyle, Check-Lists For. Trees & Shrubs Brit. Emp. 2(Nyasaland Protect.): 61. 1936.

Pterocarpus angolensis DC. Prodr. 2: 419. 1825; Bak. f. Leg. Trop. Afr. 544. 1929.

Pterocarpus bussei Harms, Bot. Jahrb. 33: 171. 1902; Bak. f. Leg. Trop. Afr. 544. 1929.

Mlanje District: Mlanje, frequent in *Brachystegia* woodland, tree to 12 m. high and to 30 cm. in diameter, deciduous, yielding very good cabinet-wood, flowers yellow, appearing before leaves, native name mlombwa, 750 m., Sept. 30, 1946, *17879*. Chikwawa District: Chikwawa, occasional in woodlands of dry stony ridges, tree 12–15 m. high, deciduous, flowers yellow, appearing before the leaves, native name mlombwa, 300 m., Oct. 4, 1946, *17976*. Tanganyika Territory, southward to the Transvaal, Swaziland, and Angola.

Pterocarpus sp. nov.

Chikwawa District: Chikwawa, locally common in stony woodlands, tree 10–12 m. high, deciduous, new leaves appearing with the flowers, flowers yellow, fragrant, native name mbalisa, 300 m., Oct. 5, 1946, *17989*.

This remarkable plant, with conspicuous leafy stipules, appears to be undescribed. At the time of writing Dr. L. A. Grandvaux Barbosa of the Secção de Botânica, Moçambique, is starting a journey of about three months to collect material of this plant in different stages, to photograph it, and to study its ecology. Afterwards he proposes to write a work on it, in which it will no doubt be most fully described. Clearly it would be premature and presumptuous to describe it formally now, and we must look forward with expectant interest to seeing the results of Dr. Grandvaux Barbosa's expert researches.

Besides in Nyasaland, the plant occurs in Portuguese East Africa (*Swynnerton 1429, Wild 2658: Gov. Herb. No. 21909, Wild 2672: Gov. Herb. No. 21943*) and S. Rhodesia (*Wild 2338:* Gov. Herb. No. 19172).

Ostryoderris stuhlmannii (Taub.) Dunn ex Bak. f. Leg. Trop. Afr. 563. 1929.

Deguelia stuhlmannii Taub. in Engl. Pflanzenw. Ost-Afr. C: 218. 1895.

Chikwawa District: Chikwawa, occasional in woodlands of stony ridges, tree 12–14 m. tall, deciduous, leafless, flowers white, native name (Chinyanja) chiumbu, 300 m., Oct. 5, 1946, *17981.* Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, and N. and S. Rhodesia.

Lonchocarpus capassa Rolfe in Oates, Matabeleland ed. 2. 397. 1889; Bak. f. Leg. Trop. Afr. 551. 1929.

Chikwawa District: Chikwawa, scattered in *Acacia albida* woodland, tree 5–6 m. high, leaves greyish beneath, flowers purple, native name (Chinyanja) chipakasa, 200 m., Oct. 3, 1946, *17922.* Tanganyika Territory, southward to the Transvaal and southwest Africa.

Afrormosia angolensis (Bak.) Harms in Engl. & Prantl, Nat. Pflanzenf. Nachtr. 3: 158. 1906; Bak. f. Leg. Trop. Afr. 600. 1929; Louis, Bull. Jard. Bot. Brux. 17: 113. 1943.

Ormosia angolensis Bak. in Oliv. Fl. Trop. Afr. 2: 255. 1871.

Zomba district: Zomba Plateau, plentiful in *Brachystegia* woodlands, tree up to about 10 m. high, crown somewhat flat-spreading, foliage pale green, flowers not seen, fruit immature, 1500 m., June 4, 1946, *16225.* Kota-kota District: Chia area, common in sandy woodlands of lake-plain, tree about 15 m. high and 40 cm. in diameter, 480 m., Sept. 6, 1946, *17555.* Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola.

Swartzia madagascariensis Desv. Ann. Sci. Nat. I. 9: 424. 1826; Bak. f. Leg. Trop. Afr. 605. 1929; Gilbert & Boutique, Fl. Congo Belge 3: 551. 1952.

Kota-kota District: Chia area, frequent on sandy lake-plain, tree 15–18 m. high and 25–35 cm. in diameter, native name (Chinyanja) kampango, 480 m., Sept. 1, 1946, *17479.* Widespread in tropical Africa.

Cordyla africana Lour. Fl. Cochinch. 412. 1790; Milne-Redhead, Repert. Sp. Nov. 41: 230. 1937.

? District: Road between Blantyre and Chikwawa, one example in *Brachystegia* woodland, tree 25 m. tall and 60 cm. in diameter, flowers orange yellow, borne in abundance, native name ntondo, 600 m., Oct. 1, 1946, *17884.* Chikwawa District: Chikwawa, associated with *Acacia albida* in open forest, tree to 25 m. high and 75 cm. in diameter, deciduous, now in young leaf, flowers orange, native name (Chinyanja) mtondo, 200 m., Oct. 3, 1946, *17927.* Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and the Transvaal.

Caesalpinia decapetala (Roth) Alston in Trimen, Handb. Fl. Ceylon 6: 89. 1931; Wilczek, Fl. Congo Belge 3: 256. 1952.

Reichardia ? decapetala Roth, Nov. Pl. Sp. 212. 1821.

Caesalpinia sepiaria Roxb. Hort. Beng. 32. 1814, nomen nudum; Fl. Ind. 2: 360. 1832; Bak. f. Leg. Trop. Afr. 615. 1930.

Cholo District: Cholo Mountain, overrunning rain-forest regrowths, scrambling shrub 5–8 m. high, flowers yellow, fruit immature, native name (Chinyanja) lungusi, 1300 m., Sept. 26, 1946, *17818.* Native of India, now widely naturalized in the tropics and subtropics of both the Old and New Worlds.

Pterolobium stellatum[27] (Forsk.) Brenan, comb. nov.

Mimosa stellata Forsk. Fl. Aegypt.-Arab. 177. 1775; Vahl, Symb. Bot. 1: 81. 1790; non *Mimosa stellata* Lour. Fl. Cochinch. 651. 1790.

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[27] *Pterolobium* R. Br. in Salt, Abyss. App. 64 (1814) is conserved against *Cantuffa* Gmel., but *Pterolobium* in the place cited is a nomen nudum. The first description appears to have been provided by Wight and Arnott, Prodr. Fl. Ind. Or. 1: 283 (1834). The common-sense solution is, I feel, to conserve *Pterolobium* from the date of its first valid publication.

Cantuffa exosa Gmel. Syst. Nat. 2: 677. 1791.
Acacia stellata (Forsk.) Willd. Sp. Pl. 4: 1078. 1806.
Pterolobium lacerans R. Br. in Salt, Abyss. App. 64. 1814, nomen nudum.
Pterolobium exosum (Gmel.) Bak. f. Leg. Trop. Afr. 621. 1930; Wilczek, Fl. Congo Belge 3: 256. 1952.

Kota-kota District: Nchisi Mountain, scrambling over marginal trees of rain-forest, shrub 10 m. high, fruit red, conspicuous, 1500 m., July 29, 1946, *17023*. Widespread in tropical Africa, with very close relatives in Arabia and further Asia.

By the kindness of the authorities of the Botanical Museum of the University of Copenhagen, I have been able to examine some of Forskål's types, including that of *Mimosa stellata*. He described his new species as follows: "foliis geminis, pinnatis, 9-jugis: spinis stellatis, ternis; duabus apice recurvis. Kurmae." The type consists of two sheets: the first, which I consider must be taken as the lectotype, consists of a lateral flowering shoot with an attached leaf whose prickles agree with Forskål's description, also of two detached fragments in very young fruit; the second sheet has a leafless flowering shoot and a detached leaf with narrower leaflets than that on the first sheet; as this latter leaf has but two prickles at each pinna-junction it does not affect the interpretation of Forskål's species. The whole of the first sheet and probably the second (the detached leaf possibly excepted) are unquestionably the plant that has been known as *Pterolobium exosum* (Gmel.) Bak. f. or *P. lacerans* R. Br. The first sheet shows clearly the imbricate aestivation of the buds, the comparatively few stamens, and the important wing beyond the single seed of the developing fruits, not to mention the characteristic foliage, inflorescence, indumentum, and prickle-arrangement. The type can be readily matched among specimens from N. E. Africa, e.g. *Pappi 160* from Eritrea.

It will be by now clear that Forskål misinterpreted the pinnae of a bipinnate leaf as whole leaves, but this mistake was soon put right by Vahl and Willdenow.

The new combination made above is thus necessary. I have given only the most important synonyms; others may be found in Bak. f. Leg. Trop. Afr. 621 (1930). He does not mention *Mimosa stellata* or *Acacia stellata*, but Christensen in Dansk Bot. Arkiv 4 (3): 29 (1922) accepts *Acacia stellata* as a valid name, with *A. glaucophylla* Steud. as a possible synonym.

Cassia petersiana Bolle in Peters, Reise Mossamb. Bot. 13. 1861; Bak. f. Leg. Trop. Afr. 633. 1930; Steyaert, Fl. Congo Belge 3: 508. 1952.

Blantyre District: Blantyre, in *Brachystegia* woodlands, shrub 2 m. high, brown-pubescent, flowers yellow, showy, 1100 m., June 18, 1946, *16355*. Kota-kota District: Nchisi Mountain, occasional on edges of rain-forest, tree or shrub 3–5 m. high, flowers yellow, fruit unripe, 1650 m., July 31, 1946, *17054*. Anglo-Egyptian Sudan and Abyssinia to the Transvaal.

Cassia singueana Del. Cent. Pl. Afr. Voy. Méroé 28 (1826) var. glabra (Hutch. ex Bak. f.) Brenan, Kew Bull. 1949: 77. 1949.

Cassia goratensis Fresen. var. *glabra* Hutch. ex. Bak. f. Leg. Trop. Afr. 634. 1930.

Kasungu District: Kasungu, sporadic in *Brachystegia* woodland, tree or shrub 3–5 m. high, flowers yellow, native name devi-devi, 1000 m., Aug. 25, 1946, *17415*. The species widespread in tropical Africa, the variety in Nyasaland, N. and S. Rhodesia, and (according to Baker f. l.c.) in Kenya Colony.

Cassia grantii Oliv. Fl. Trop. Afr. 2: 279. 1871; Bak. f. Leg. Trop. Afr. 639. 1930.

Kota-kota District: Chia area, on disturbed ground in dry sandy woodlands of lake-plain, herb, branches prostrate, flowers yellow, 480 m., Sept. 6, 1946, *17549*. Kenya, Tanganyika Territory, Nyasaland, Portuguese East Africa, and Angola.

Cassia mimosoides L. Sp. Pl. 379 (1753) var. **glabriuscula** Ghesq. Bull. Jard. Bot. Brux. 9: 160. 1932.

North Nyasa District: Nchena-chena, occasional in *Brachystegia* woodland, shrub 1 m. high, flowers yellow, 1340 m., Aug. 21, 1946, *17372.* Both the species and the variety pantropical, teste Ghesquière, op. cit. 161.

Bauhinia petersiana Bolle in Peters, Reise Mossamb. Bot. 24. 1861; Bak. f. Leg. Trop. Afr. 656. 1930; Wilczek, Fl. Congo Belge 3: 274. 1952.

Blantyre District: Blantyre, in *Brachystegia* woodlands, tree, softly brownish-puberulent, native name (Chinyanja) pandula, 1100 m., June 18, 1946, *16356.* Tanganyika Territory, Nyasaland, N. and S. Rhodesia, and Portuguese East Africa.

Julbernardia paniculata (Benth.) Troupin, Bull. Jard. Bot. Brux. 20: 316. 1950.

Berlinia paniculata Benth. Trans. Linn. Soc. 25: 311. 1865; Bak. f. Leg. Trop. Afr. 687. 1930.

Isoberlinia paniculata (Benth.) Hutch. ex Greenway, Kew Bull. 1928: 203. 1928.

Kota-kota District: Nchisi Mountain, common locally in *Brachystegia* woodland, tree 8–12 m. high and 30 cm. in diameter, bark dark grey, rough, inner bark yellow, branches spreading into a flat-topped crown, leaves glossy above and beneath, flowers brown, fruit immature, native name (Chinyanja) mchenga, 1400 m., Aug. 1, 1946, 17098. Kasungu District: Kasungu, frequent in *Brachystegia* woodland, tree to 15 m. tall and 30 cm. in diameter, native name (Chinyanja) mchenga, 1000 m., Aug. 26, 1946, *17430.*

Hauman, Fl. Congo Belge 3: 403 (1952) separates this from *Julbernardia* as *Pseudoberlinia paniculata* (Benth.) Duvign.

Julbernardia globiflora (Benth.) Troupin, Bull. Jard. Bot. Brux. 20: 311. 1950.

Brachystegia globiflora Benth. Hook. Ic. Pl. **14**: 43. 1881.
Berlinia globiflora (Benth.) Harms in Engl. Pflanzenw. Afr. **3** (1): 472. 1915; Bak. f. Leg. Trop. Afr. 689. 1930.
Isoberlinia globiflora (Benth.) Hutch. ex Greenway, Kew Bull. **1928**: 203. 1928.

Kota-kota District: Chia area, plentiful in sandy woodlands of lake-plain, tree to 10 m. high, outer bark close, grey, inner bark pale, native name (Chinyanja) kamponi, 480 m., Sept. 1, 1946, *17475.* Tanganyika Territory, Nyasaland, N. and S. Rhodesia, and Portuguese East Africa.

Hauman, Fl. Congo Belge 3: 403 (1952) separates this from *Julbernardia* as *Pseudoberlinia globiflora* (Benth.) Duvign.

Brachystegia[27a] **boehmii** Taub. in Engl. Pflanzenw. Ost-Afr. C: 197. 1895; Burtt Davy & Hutch. Kew Bull. **1923**: 151. 1923: Bak. f. Leg. Trop. Afr. 721. 1930; P. Topham, Kew Bull. **1930**: 353. 1930; Hoyle, Fl. Congo Belge 3: 474. *pl. 33.* 1952.

Brachystegia flagristipulata Taub. in Engl. Pflanzenw. Ost-Afr. C: 198. 1895; Burtt Davy & Hutch. Kew Bull. **1923**: 152. 1923; Bak. f. Leg. Trop. Afr. 722. 1930; P. Topham, Kew Bull. **1930**: 355. 1930.
Brachystegia filiformis Hutch. & Burtt Davy, Kew Bull. **1923**: 150. 1923; Bak. f. Leg. Trop. Afr. 722. 1930; P. Topham, Kew Bull. **1930**: 356. 1930.

Kasungu District: Kasungu, one of chief species of secondary-growth woodlands which occupy most of this area, tree 6–8 m. high, [in fruit,] 1000 m., Aug. 26, 1946, **17428.** Tanganyika Territory to S. Rhodesia, Portuguese East Africa, and Angola, and intermediate countries.

A variable, widely distributed species which usually occupies the lower slopes of hills and ridges and is recognized by its long drooping leaves and pinkish-brown, rather rough pods.

[27a] *Brachystegia* by A. C. Hoyle, Imperial Forestry Institute, Oxford.

Brachystegia spiciformis Benth. Trans. Linn. Soc. 25: 312. 1866; Burtt Davy & Hutch. Kew Bull. 1923: 159. 1923; Bak. f. Leg. Trop. Afr. 727. 1930.

Brachystegia appendiculata Benth. Trans. Linn. Soc. 25: 313. *pl. 42.* 1866; Oliv. Fl. Trop. Afr. 2: 305. 1871; Burtt Davy & Hutch. Kew Bull. 1923: 162. 1923; Bak. f. Leg. Trop. Afr. 728. 1930; P. Topham, Kew Bull. 1930: 364. 1930.

Brachystegia randii Bak. f. Jour. Bot. 37: 433. 1899; Leg. Trop. Afr. 727. 1930; Burtt Davy & Hutch. Kew Bull. 1923: 160. 1923; P. Topham, Kew Bull. 1930: 360. 1930.

Brachystegia bragaei Harms. Bot. Jahrb. 30: 82. 1901; Burtt Davy & Hutch. Kew Bull. 1923: 161. 1923; Bak. f. Leg. Trop. Afr. 726. 1930; P. Topham, Kew Bull. 1930: 359. 1930.

Brachystegia bockii De Wild. Repert. Sp. Nov. 11: 512. 1913; Burtt Davy & Hutch. Kew Bull. 1923: 159. 1923; P. Topham, Kew Bull. 1930: 362. 1930.

Brachystegia edulis Hutch. & Burtt Davy, Kew Bull. 1923: 162. 1923; Bak. f. Leg. Trop. Afr. 727. 1930; P. Topham, Kew Bull. 1930: 361. 1930.

Zomba District: Zomba Plateau, one of the chief trees of the open woodlands, tree up to about 10 m. high, leaves more or less concave, rather dull above, shining below, flower not seen, [in fruit,] 1500 m., June 4, 1946, *16220.* Kota-kota District: Nchisi Mountain, in *Brachystegia* woodland of lower slopes, not common, tree 8–12 m. high, 20–30 cm. in diameter, bark rough, dark grey, inner bark yellowish, branches spreading into a wide, flattish crown, fruit immature, 1350 m., Aug. 2, 1946, *17103*; ibid., prevailing tree of the woodlands—often the only tree present, tree 3–15 m. tall, to 40 cm. in diameter, bark rough, grey, reddish when cut, branches forming a flattish to very flat spreading crown, leaves pale green, native name (Chinyanja) mchenga [in fruit], 1400 m., Aug. 4, 1946, *17126.* Kenya to S. Rhodesia, Portuguese East Africa, and Angola, and intermediate countries.

This, the most widespread and variable species, is also the one on which Bentham based his genus, using very scanty material. There are innumerable varieties and forms, the specimens cited above representing pubescent forms allied respectively to the originals of *B. appendiculata (Brass 16220, 17126)* and *B. bockii (Brass 17103),* which are both regarded as conspecific with *B. spiciformis.* The synonymy given is confined to what seems appropriate to major Nyasaland citations of the genus, and represents only a fragment of the total.

Brachystegia taxifolia Harms, Bot. Jahrb. 33: 155. 1902; Burtt Davy & Hutch. Kew Bull. 1923: 153. 1923; Bak. f. Leg. Trop. Afr. 717. 1930; Hoyle, Fl. Congo Belge 3: 480. 1952.

Brachystegia mimosifolia Hutch. & Burtt Davy, Kew Bull. 1923: 153. 1923; Bak. f. Leg. Trop. Afr. 717. 1930; P. Topham, Kew Bull. 1930: 353. 1930.

Mombera District: 40 miles north of Mzimba, dominant in sandy woodlands, tree 8–10 m. high, branches horizontal, spreading into a flattish crown, [in fruit,] 1350 m., Aug. 9, 1946, *17143.* Mombera or Kasungu District (?): North Road between Mzimba and Kasungu, dominant on infertile, greyish sandy soil, tree 5–10 m. high, branches horizontal, forming a flat crown, young leaves reddish-brown, flowers green, filaments white, [flower and fruit,] 1200 m., Aug. 23, 1946, *17385.* S. Tanganyika, Belgian Congo, N. Rhodesia, and Nyasaland.

This species has a relatively limited distribution and varies little except in hairiness. It is interesting because of its evergreen or near-evergreen habit, shown well by *Brass 17385* which retains numerous old leaves with the new foliage and flowers. There is strong circumstantial evidence from recent field observations and collections by Mr. J. P. M. Brenan in N. Rhodesia that hybrids occur (both locally and botanically) between this species and *B. boehmii.*

Brachystegia utilis Hutch. & Burtt Davy, Kew Bull. 1923: 155. 1923; Bak. f. Leg. Trop. Afr. 725. 1930; P. Topham, Kew Bull. 1930: 359. 1930, Angola citations excluded; Hoyle, Fl. Congo Belge 3: 468. 1952.

Kota-kota District: Chia area, common in sandy woodlands of lake-plain, tree to 20 m. high, to 50 cm. in diameter, outer bark rough, inner red, leaves greyish below, [in fruit,] 480 m., Sept. 3, 1946, *17506.* Tanganyika, Belgian Congo, N. and S. Rhodesia, Nyasaland, and Portuguese East Africa.

Normally a species of hills and upper parts of the plateaux. The specimen collected by Mr. Brass is from an unusually low altitude, and this may account for its being very depauperate in appearance even for Nyasaland, especially in the pods, which usually have three or more seeds.

Dichrostachys glomerata (Forsk.) Chiov. Ann. Bot. Roma **13**: 409. 1915; Hutch. & Dalz. ex Greenway, Kew Bull. **1928**: 204, 401. 1928; Bak. f. Leg. Trop. Afr. 807. 1930; Gilbert & Boutique, Fl. Congo Belge 3: 202. 1952.

Mimosa glomerata Forsk. Fl. Aegypt.-Arab. 177. 1775.

Chikwawa District: Chikwawa, in dry bushy forest of river-plain, shrub 4 m. high, native name (Chinyanja) chipungala, 200 m., Oct. 2, 1946, *17902*; ibid., scattered in *Acacia albida* woodland, tree or shrub 5 m. high, basal flowers of spike pink, others yellow, native name (Chinyanja) chisio, 200 m., Oct. 3, 1946, *17913.* Native of tropical Africa and Asia, also introduced into Florida and Cuba.

Mimosa pigra L. Cent. Plant. **1**: 13. 1755; Gilbert & Boutique, Fl. Congo Belge 3: 230. 1952.

Mimosa asperata L. Syst. Nat. ed. 10. 1312. 1759; Bak. f. Leg. Trop. Afr. 812. 1930.

Kota-kota District: Benga, west shore of Lake Nyasa, frequent on sandy lakeshores, shrub 2 m. high, somewhat scrambling, flowers palest pink, 470 m., Sept. 2, 1946, *17481.* Tropics of Old and New Worlds.

Acacia nigrescens Oliv. Fl. Trop. Afr. 2: 340. 1871; Bak. f. Leg. Trop. Afr. 829. 1930.

Chikwawa District: Lower Mwanza River, frequent in open forest of river-plain, tree to 25 m. high and to 60 cm. in diameter, deciduous, now in young leaf, flowers cream-coloured, 180 m., Oct. 4, 1946, *17951.* Tanganyika Territory to Natal and the Transvaal.

Acacia campylacantha Hochst. ex A. Rich. Tent. Fl. Abyss. **1**: 242. 1847; Bak. f. Leg. Trop. Afr. 831. 1930.

Kota-kota District: Nchisi, common in old second-growth forest, tree to 25 m. tall and 80 cm. in diameter, fruit immature, native names (Chinyanja) minga, (Chichewa) miwa, 1000 m., Aug. 1946, *17116.* Widespread in tropical Africa, extending southwards to the Transvaal.

Acacia ? xiphocarpa Hochst. ex Benth. Lond. Jour. Bot. 5: 96. 1846; Pichi-Sermolli, Miss. Stud. Lago Tana **1**: 52. 1951.

Zomba District: Zomba Plateau, occasional in *Brachystegia* woodlands and common in second-growth rain-forest in gullies on slopes of mountains, tree up to about 12 m. high, very strikingly flat-topped, flowers not seen, fruit immature (reddish with green margins), 1400–1500 m., June 5, 1946, *16234.* Anglo-Egyptian Sudan to S. Rhodesia.

I do not at present feel certain that the East African material named *A. xiphocarpa* is identical with the Abyssinian type.

Acacia seyal Del. Fl. Aegypt. 286. *pl. 52, f. 2.* (1812) var. **multijuga** Schweinf. ex. Bak. f. Leg. Trop. Afr. 844. 1930.

Acacia stenocarpa sensu Bak. f. Leg. Trop. Afr. 845. 1930; non Hochst. ex A. Rich.

Kasungu District: Kasungu, a common shrub in cut-over *Brachystegia* woodland, shrub 1–1.5 m. high, flowers yellow, seeds green when ripe, 1000 m., Aug. 24, 1946, *17405.*

This is probably a distinct species from *A. seyal,* and widespread in tropical Africa. I have used the varietal name, as it is the only certain available one for this plant at present. See Brenan, Check-lists For. Trees & Shrubs Brit. Emp. 5 (Tanganyika Territory) (2): 338 (1949).

Acacia (cf.) **subalata** Vatke, Oesterr. Bot. Zeitschr. 30: 276. 1880; Bak. f. Leg. Trop. Afr. 850. 1930.

Acacia benthami Rochebr. Toxic. Afr. 2: 192. 1898; non *A. benthamii* Meisn. in Lehm. Pl. Preiss. 11. 1844–45.

Chikwawa District: Chikwawa, in *Acacia albida* woodland, tree or shrub 5 m. high, flowers yellow, 200 m., Oct. 3, 1946, *17914*. Somaliland to the Transvaal and Natal.

The determination is probably right, but I should feel happier with pods.

Acacia xanthophloea Benth. Trans. Linn. Soc. 30: 511. 1875; Bak. f. Leg. Trop. Afr. 851. 1930.

Chikwawa District: Lower Mwanza River, common on sandy river-banks, tree to 20 m. high and 0.5 m. in diameter, bark yellow, very conspicuous, flowers yellow, fruit young, native name (Chinyanja) chezimi, 200 m., Oct. 3, 1946, *17928*. Kenya to the Transvaal and Zululand.

Albizzia harveyi Fourn. Bull. Soc. Bot. Fr. 12: 399. 1865; Bak. f. Leg. Trop. Afr. 865. 1930; Gilbert & Boutique, Fl. Congo Belge 3: 173. 1952.

Chikwawa District: Chikwawa, frequent in *Acacia albida* woodland, tree 5–6 m. high, flowers greenish-white, fragrant, 200 m., Oct. 3, 1946, *17912*. Kenya, Tanganyika Territory, Nyasaland, N. and S. Rhodesia, Portuguese East Africa, Bechuanaland, and the Transvaal.

Albizzia gummifera (J. F. Gmel.) C. A. Sm. Kew Bull. 1930: 218. 1930; Brenan, Kew Bull. 1952: 511. 1953.

Sassa gummifera J. F. Gmel. Syst. Nat. 2: 1038. 1791.

Zomba District: Zomba Plateau, frequent in gulley rain-forest, tree up to 12 m. high, 10–50 cm. in diameter at breast-height, branches flat, spreading, making a handsome pale-foliaged tree, flowers not seen, fruit immature, 1450 m., June 5, 1946, *16255*. Cholo District: Cholo Mountain, abundant in rain-forest canopy layer, tree to 30 m. high and 60 cm. in diameter, deciduous, young leaves reddish, conspicuous in the forest, in bud only, native name tanga-tanga, 1200 m., Sept. 25, 1946, *17803*. Southeastern Nigeria, Cameroons, Spanish Guinea, Gaboon, Belgian Congo, Abyssinia, Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, S. Rhodesia, and Angola.

Albizzia adianthifolia (Schumach.) W. F. Wight, U. S. Dep. Agr. Bur. Pl. Ind. Bull. 137: 12. 1909; Brenan, Kew Bull. 1952: 520. 1953.

Mimosa adianthifolia Schumach. in Schumach. & Thonn. Beskriv. Guin. Pl. 322. 1827.

Cholo District: Cholo Mountain, Cholo, plentiful in rain-forests, tree 20–30 m. high and up to 75 cm. in diameter, flowers white, native name tanga-tanga, 1100 m., Sept. 29, 1946, *17859*. Widely distributed in tropical Africa, from Senegal in the west to Uganda in the east, and as far southwards as the Transvaal and Natal.

ROSACEAE

Parinari mobola Oliv. Fl. Trop. Afr. 2: 368. 1871; Hauman, Bull. Jard. Bot. Brux. 21: 193. 1951.

North Nyasa District: Nchena-chena, occasional in *Brachystegia* woodlands, much branched and shapely tree to 12 m. tall and to 35 cm. in diameter, young leaves and shoots brown-pubescent, flowers pink, native name (Chinyanja) muula, 1340 m., Aug. 21, 1946, *17377*. Kasungu District: Kasungu, frequent in *Brachy-*

stegia woodland, tree to 12 m. tall and 60 cm. in diameter, flowers pale pink, 1000 m., Aug. 26, 1946, *17423.* Kota-kota District: Chia area, common in sandy woodlands of lake plain, tree to 20 m. high and to 60 cm. in diameter, flowers pale pink, native name (Chinyanja) muula, 480 m., Sept. 1, 1946, *17467.* Kenya, Tanganyika Territory, Belgian Congo, Portuguese East Africa, N. and S. Rhodesia, Nyasaland, Angola, and the Transvaal.

Some authors have included this under *P. curatellifolia* Planch., but *P. mobola* differs in the brown, denser, more spreading hair on the inflorescence, contrasting with the usually silvery-grey and more appressed hair of the former. The two may not be specifically distinct, however, for intermediates certainly occur.

Hirtella zanzibarica Oliv. Hook. Ic. Pl. *pl. 1193.* 1876; Brenan, Trop. Woods 86: 5. 1946.

Kota-kota District: Chia area, common on banks of waterholes in dry woodlands of lake-plain, tree to 25 m. high and to 50 cm. in diameter, inflorescence viscid, petals white, fugacious, calyx and stamens green, native name (Chinyanja) kalango, 480 m., Sept. 3, 1946, *17514.* Kenya to Portuguese East Africa and Nyasaland.

Hirtella bangweolensis (R.E.Fr.) Greenway, Kew Bull. 1928: 199. 1928; Hauman, Bull. Jard. Bot. Brux. 21: 183. 1951.

Parinari bangweolense R. E. Fr. Repert. Sp. Nov. 12: 540. 1913.

Kota-kota District: Chia area, common in sandy woodlands, tree to 6–15 m. high and to 40 cm. in diameter, flowers white, native name (Chinyanja) mchenja, 480 m., Sept. 1, 1946, *17463.* The first record from Nyasaland; previously known only from SW. Tanganyika Territory and N. Rhodesia, with a variety, according to Hauman (l.c.), in the Bas-katanga District of the Belgian Congo.

Pygeum africanum Hook f. Jour. Linn. Soc. Bot. 7: 191. 1864.

Kota-kota District: Nchisi Mountain, tree 25 m. high and 40 cm. in diameter, petioles red, leaves dark green and glossy above, much paler below, flowers dry, fruit immature, 1500 m., July 29, 1946, *17026.* Widespread on the hills and mountains of tropical and South Africa.

Alchemilla nyikensis De Wild. Bull. Jard. Bot. Brux. 7: 376. 1921.

North Nyasa District: Nyika Plateau, plentiful in grass on marshy ground, herb, flowers green later reddish, 2300 m., Aug. 13, 1946, *17201.*

I have compared *Brass 17201* with the type of *A. nyikensis* at the British Museum (Natural History), collected by M. M. S. Henderson on the Nyika Plateau in 1903.

Rubus exsuccus Steud. ex A. Rich. Tent. Fl. Abyss. 1: 256. 1847; Gustafsson, Ark. Bot. 26A^7: 36. 1934.

Cholo District: Cholo Mountain, frequent in rain-forest regrowth, subscandent shrub 2 m. high, petals none, filaments pale purple, 1200 m., Sept. 19, 1946, *17653;* ibid., scrambling shrub 2–3 m. high, fruit black when ripe, good-flavoured, 1200 m., Sept. 21, 1946, *17706.* East Africa, from Abyssinia to Nyasaland and probably S. Rhodesia.

Rubus rigidus Sm. f. **lachnocarpus** Gust. Bot. Notiser 1932: 18. 1932; Ark. Bot. 26A^7: 58. 1934.

Zomba District: Zomba Plateau, frequent in moist grassy clearings, weak shrub 1 m. high, leaves whitish below, petals and filaments pale purple, 1400 m., May 28, 1946, *16070*; ibid., occasional in open grasslands, shrub about 1 m. high, fruit about 2 cm. in diameter, orange-red, sweet and palatable, 1770 m., May 31, 1946, *16138.* The species (in a wide sense) from Uganda to South Africa; the form from Tanganyika Territory, Nyasaland, Portuguese East Africa, and S. Rhodesia.

Rubus ellipticus Sm. in Rees, Cyclop. 30: no. 16. 1819; Focke, Bibl. Bot. 17^{72}: 198. 1911.

Zomba District: Zomba Plateau, frequent in grassy clearings, shrub to 3 m. high, very robust, canes stout, red-hairy, leaves grey-green beneath, flowers white, 1400 m., May 28, 1946, *16065*. Mlanje District: Mlanje Mountain; Luchenya Plateau, plentiful in forest regrowth, shrub up to 6 m. high, canes red-hairy, very stout, arched or scrambling, flowers white, fruit not seen, 1890 m., June 30, 1946, *16543*.

This species is not a native of Africa, but has a wide distribution in Asia (India, Ceylon, Burma, China, Philippines), and is said by Focke to be naturalised in Jamaica. It has evidently been on Mlanje for some years. I am indebted to my friend and former colleague Mr. A. C. Hoyle, Curator of the Herbarium of the Imperial Forestry Institute, Oxford, for informing me of the following sheet in that herbarium: Nyasaland: On Mlanje at Woodmen's camp, fruit yellow, small, edible, agreeably acid, Sept. 24, 1929, *Burtt Davy 22060*.

In the same herbarium there is a sheet of this species taken from a plant cultivated at Amani, Tanganyika Territory *(Greenway 1742)*.

As *Rubus ellipticus* is unmentioned in Gustafsson's recent revision of the African *Rubi* (Ark. Bot. $26A^7$: 1–68. 1934) and its identification may be thus a matter of difficulty, it may be helpful to mention here the salient features of this very striking species. The most obviously unusual character is the long red-purple setae that more or less densely clothe the stems, petioles, and petiolules; they are present on the inflorescence, but less dense. The leaflets are three per leaf, usually grey- or white-tomentose beneath and obtuse or scarcely pointed at the apex. The inflorescence is composed of short axillary branches and a dense, many-flowered extra-axillary portion. The flowers are medium-sized. This combination of characters (and especially the dense setae) will separate *R. ellipticus* from all the species described from tropical Africa.

Hagenia abyssinica (Bruce) J. F. Gmel. Syst. Nat. 2: 613. 1791.

Banksia [*"Bankesia"*] *abyssinica* Bruce, Trav. Egypt, Arabia, Abyss. & Nubia 5: 73. 1790.

North Nyasa District: Nyika Plateau, plentiful in upper montane forest of escarpment, also in second-growth forest, tree to 12 m. tall and to 30 cm. in diameter, bark brown, flaky, leaves viscid, inflorescences on lateral branches which dry and drop off after fruiting, 2350 m., Aug. 17, 1946, *17298*. Mountains of east and central Africa from the Anglo-Egyptian Sudan and Abyssinia to Nyasaland.

Cliffortia nitidula (Engl.) R. E. & T. C. E. Fr. Notizbl. Bot. Gart. Berlin 8: 649. 1923; Weim. Monogr. Gen. *Cliffortia* 47. 1934.

Cliffortia linearifolia Eckl. & Zeyh. var. *nitidula* Engl. Bot. Jahrb. 26: 376. 1899.

Mlanje District: Mlanje Mountain; Luchenya plateau, plentiful in forest regrowth and in forest-border shrubberies, shrub up to 4 m. high, leaves convex, glossy, flowers greenish, 1870 m., June 27, 1946, *16457*. Kenya to S. Rhodesia and Angola; a distinct subspecies in South Africa, according to Weimarck.

Weimarck *(op. cit.)* separates a species from Kenya, *C. aequatorialis* R. E. & T. C. E. Fr., from *C. nitidula* by the usually more revolute leaflet-margins and by the leaflets having a small red gland at the apex. The leaflet-margins of *C. aequatorialis* are more constantly and strongly revolute than in typical *C. nitidula*, though exactly comparable with those plants from Angola which Weimarck has called *C. nitidula* subsp. *angolensis*; and occasional leaves equally strongly revolute may be seen on plants of typical *C. nitidula*. I have observed a "gland" similar to that of *C. aequatorialis* on the leaves of all gatherings of *C. nitidula* examined, though the "gland" is there often unpigmented, and in the Angola specimens apparently always so. It should be noted that this pigment is not restricted to the "gland" but may cover the whole leaf-tip. I have been unable to detect any significant differences between *C. nitidula, C. aequatorialis,* and *C. nitidula* subsp. *angolensis.* The width of the sepals in the ♂ flowers, the degree of their connation, and the number of stamens seem to vary considerably. Kenya material has four stamens and rather deeply divided lobes, but this may readily be matched in other parts of the range. The narrower sepals of *C. nitidula* subsp. *angolensis*, mentioned by Weimarck, are narrower only than in *some* specimens of typical *C. nitidula.* Thus in *Welwitsch 1277* (Angola), one of the specimens on which the subspecies was based, they are 1.6–1.75 mm. wide; while, among specimens of typical *C. nitidula*, *Brass 16457* and *Wild 1442* (S. Rhodesia) have them 1.4 mm. wide and in *Fries, Norlindh & Weimarck 3685* (S. Rhodesia) they are 1.5 mm. wide.

The three plants under discussion appear then to be geographical variations, separable only by slight differences in foliage, not of specific, or in my opinion, of subspecific significance. I therefore propose the two following varieties:–

Cliffortia nitidula var. **angolensis** (Weim.) Brenan, stat. nov.

Cliffortia nitidula subsp. *angolensis* Weim. Monogr. Gen. *Cliffortia* 47. 1934.

Leaflets normally linear, parallel-sided, and green at the apex, not oblanceolate as in typical *C. nitidula.*

Cliffortia nitidula var. **aequatorialis** (R. E. & T. C. E. Fr.) Brenan, comb. nov.

Cliffortia aequatorialis R. E. & T. C. E. Fr. Notizbl. Bot. Gart. Berlin **8**: 649. 1923; Weim. Monogr. Gen. *Cliffortia* 50. 1934.

Leaflets as in the preceding variety but purple-tipped, especially when young.

A single gathering, *Welwitsch 1277c* (on Morro de Lopollo, Apr. 1860), has been made in Angola of a plant in leaflet-shape very close to typical *C. nitidula*, but differing in having most of the internodes glabrous. More material must show whether this is a constant variation.

Cliffortia nitidula subsp. *pilosa* Weim. Monogr. Gen. *Cliffortia* 49 (1934) appears to be quite distinct.

SAXIFRAGACEAE

Choristylis rhamnoides Harv. Lond. Jour. Bot. **1**: 19. 1842.

Choristylis shirensis Bak. f. Trans. Linn. Soc. II. Bot. **4**: 13. 1894.

Mlanje District: Mlanje Mountain, southwest ridge, in stunted forest on banks of a stream, tree 3–4 m. high, 2120 m., June 28, 1946, *16507.* Uganda to the Cape.

There is a tendency for the tropical plants to have broader and more sharply pointed leaves than those at the Cape, but the difference is at best very slight; it is also inconstant and I consider decidedly not a specific one. Dissection of the flowers shows no other difference worth worrying about.

CRASSULACEAE

Crassula pentandra (Royle ex Edgew.) Schönl. in Engl. & Prantl, Nat. Pflanzenf. 3^{2a}: 37. 1890.

Tillaea pentandra Royle ex Edgew. Trans. Linn. Soc. **20**: 50. 1846.

Zomba District: Zomba Plateau, occasional in tufts on exposed mossy rocks, herb 10 cm. high, fleshy, flowers green, 1400 m., May 30, 1946, *16092*; ibid., confined to dry sunny rocks and moist or wet open seepage slopes, herb 5–15 cm. high, fleshy, flowers greenish, 1500 m., June 5, 1946, 16261. Anglo-Egyptian Sudan to Nyasaland and Angola, also on the Cameroon Mountain in West Africa, and in Socotra, Arabia, and India.

Crassula pentandra (Royle ex Edgew.) Schönl. var. **denticulata** Brenan, var. nov.

A typo differt foliorum marginibus incrassatis minute papillosis denticulatisque, sepalis apice longe attenuatis et ibi albidis ac sparse papilloso-denticulatis.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common locally on tops of exposed rocks in grassland, herb 10–20 cm. high, reddish, fleshy, 2200 m., July 11, 1946, *16784* (TYPUS varietatis).

Besides the above, the following specimen is also to be referred to this variety: TIBET: Kyi Chu Valley near Lhasa, Aug. 1904, *Capt. H. J. Walton s.n.* (Herb. Kew.).

This new variety seems to differ from the type of the species only in the development of papillae or denticles on the leaf-margins and sepals. This is particularly noticeable in the apical tufts of young leaves where the roughened apices are numerous and close together. The Tibetan specimen is a dwarf form with stems only up to 4 cm. long, contrasting with the Nyasaland gathering whose stems are up to 20 cm. long. The habit of *Crassula pentandra* varies widely, and seems to be of no taxonomic significance.

Crassula sarcocaulis Eckl. & Zeyh. Enum. Pl. Afr. Austr. 295. 1837; Schönl. Trans. Roy. Soc. S. Afr. **17**: 214. 1929.

Mlanje District: Mlanje Mountain; Luchenya Plateau, stems very thick and pitted, leaves fleshy, subterete, flowers white, 2150 m., July 9, 1946, *16746*. Nyasaland and South Africa.

This plant has been previously collected on Mlanje Mountain, in 1897 *(Adamson 423)* and in 1901 *(Purves 30)*; both these specimens are at Kew and have previously not been certainly identified, though both *C. parvisepala* Schönl. and *C. ericoides* Haw. have been suggested as possible affinities; neither of these species is the same as the Nyasaland plant. I can find no significant difference between these Nyasaland gatherings and *C. sarcocaulis*, although the latter has been previously recorded from South Africa only. The distribution is unlikely to be as discontinuous as it seems, and *C. sarcocaulis* should be sought for in the mountains of Southern Rhodesia.

Crassula globularioides Britten in Oliv. Fl. Trop. Afr. 2: 389. 1871.

Zomba District: Zomba Plateau, plentiful on rocks on a sunny seepage slope, perennial herb 5–10 cm. high, leaves succulent, apex red, unopened flowers white, other parts of inflorescence red, a very attractive species, forming small "dinner-mats," 1450 m., June 9, 1946, *16327*. Mlanje District: Mlanje Mountain; Luchenya Plateau, very abundant on dry rocks in grassland, herb 3–10 cm. high, growing in compact clumps, a very attractive species, petals white, calyx and bracts red, 2150 m., July 11, 1946, **16798**. Apparently endemic to Nyasaland.

Crassula alba Forsk. Fl. Aegypt.-Arab. 60. 1775.

Crassula abyssinica A. Rich. Tent. Fl. Abyss. **1**: 309. 1848; Schönl. Trans. Roy. Soc. S. Afr. **17**: 226. 1929.

Crassula mannii Hook. f. Jour. Linn. Soc. Bot. **7**: 193. 1864; Hutch. & Dalz. Fl. W. Trop. Afr. **1**: 103, 104. 1927.

Zomba District: Zomba Plateau, occasional on open grassy slopes, herb 20–40 cm. high, leaves fleshy, flowers white, the corolla persistent and reddish in fruit, 1500 m., June 5, 1946, *16235*. Arabia, Anglo-Egyptian Sudan to the Transvaal, also on the Cameroon Mountain and in Angola.

Although Hutchinson and Dalziel (l.c.) maintain *C. mannii* Hook. f. as distinct, I agree with Britten (in Oliv. Fl. Trop. Afr. **2**: 388, 389. 1871) and, apparently, Berger (in Engl. & Prantl, Nat. Pflanzenf. ed. 2. **18a**: 394. 1930) in being unable to separate the Cameroon Mountain plant from that in East Africa. Whether the varieties established by Schönland under *C. abyssinica* (Bot. Jahrb.

43: 359–60. 1909) are significant must be decided by more ample material and by careful observation in the field. For the present I would prefer merely to regard this plant as a variable species.

Crassula ? rosularis Haw. Rev. Pl. Succ. 13. 1821; Schönl. Trans. Roy. Soc. S. Afr. 17: 243. 1929.

A photograph and a specimen in the Herbarium of the Royal Botanic Gardens, Kew, of a cultivated plant in the New York Botanical Garden, said to have been collected by Mr. Brass on the Vernay Nyasaland Expedition, may be *C. rosularis*, but the material is insufficient for certainty. *C. rosularis* has hitherto been considered to occur only in South Africa.

Crassula ? argyrophylla Diels ex Schönl. & Bak. f. Jour. Bot. 40: 290. 1902; Schönl. Trans. Roy. Soc. S. Afr. 17: 258. 1929.

Zomba District: Zomba Plateau, in shallow soil on exposed or half-shaded dry rocks, herb, flowers white, 1500 m., June 10, 1946, *16329**. Mlanje District: Mlanje Mountain, west slope, scattered or grouped on dry open rock-faces, herb 15–20 cm. high, leaves thick and fleshy, flat or more or less convex, often reddish, flowers white, 1420 m., June 24, 1946, *16412.* Kota-kota District: Chenga Hill, gregarious on dry exposed rocks, 10–15 cm. high, flowers white, an attractive species, 1600 m., Sept. 9, 1946, *17611.* Nyasaland ?, S. Rhodesia to South Africa.

The differences between Nyasaland plants and those from South Africa—the leaves of the former usually more hairy, with a strong tendency to become suborbicular—are probably of no great systematic importance, but it seems wiser not to be too confident about the identification until more abundant material is available from the whole geographical range of the species. Plants similar to those of Mr. Brass have been previously collected in Nyasaland (*Purves 117* in Herb. Kew.). I suspect that *Crassula illichiana* Engl. ex Engl. & Diels, Bot. Jahrb. 39: 465 (1907), described from the Usambara Mountains in Tanganyika Territory, may be another form or variety of *C. argyrophylla* with more hair than usual.

Kalanchoë lanceolata (Forsk.) Pers. Syn. 1: 446. 1805; Raymond-Hamet, Bull. Herb. Boiss. II. 8: 32. 1908.

Cotyledon lanceolata Forsk. Fl. Aegypt,-Arab. 89. 1775.

Kota-kota District: Nchisi Mountain, in shallow soil on dry rocks in *Brachystegia* woodland, herb 20–60 cm. high, flowers orange-yellow, panicle viscid-pubescent, fruiting calyx reddish, 1400 m., Aug. 5, 1946, *17134.* Chikwawa District: Chikwawa, occasional in dry brushy forest of elevated alluvial plain, annual herb 60–80 cm. high, fleshy, leaves mostly dry, flowers orange-red, 200 m., Oct. 2, 1946, *17887.* Anglo-Egyptian Sudan to S. Rhodesia, Angola, and Nigeria; also in Arabia and India.

Kalanchoë lateritia Engl. Pflanzenw. Ost-Afr. C: 189 (1895) var. **zimbabwensis** (Rendle) Brenan, comb. nov.

Kalanchoë zimbabwensis Rendle, Jour. Bot. 70: 90. 1932.

Mlanje District: Likubula Gorge, rocky places in *Brachystegia* woodland, herb 20–40 cm. high, fleshy, leaves reddish, flowers yellow, attractive, 840 m., July 18, 1946, *16879.* The species in Kenya and Tanganyika Territory, the variety in Nyasaland and S. Rhodesia.

This plant belongs to a complex which Raymond-Hamet in his monograph of *Kalanchoë* (Bull. Herb. Boiss. II. 8: 36. 1908) grouped under the specific name *K. velutina* Welw. ex Britten, which, however, appears to represent a distinct species that I have only seen from Angola. The next available name seems to be *K. lateritia* Engl., based on a plant from Tanganyika Territory and Kenya with usually ± laxly branched inflorescences and often narrow and acuminate calyx-teeth. However, none of these characters is constant and the species seems very variable in habit, leaf-size, crenation, amount of indumentum, size and density of inflorescence, calyx, etc. The varietal name proposed above seems worth retaining provisionally for several gatherings from S. Rhodesia and Nyasaland with very condensed, densely hairy inflorescence and rather broader, acute but scarcely acuminate calyx-teeth. Mr. Brass' is the first gathering of this plant made in Nyasaland, except for a very scrappy specimen collected by Whyte on Mt. Chiradzulu, which may belong here.

Since the preceding paragraphs were written, Raymond-Hamet (Bol. Soc. Brot. II. 24: 97 et seq. 1950) has admitted that *K. lateritia* (and *K. angolensis* N.E. Br.) are specifically distinct from *K. velutina*, and discusses the latter species at great length. But nothing is said of *K. zimbabwensis*.

DROSERACEAE

Drosera burkeana Planch. Ann. Sci. Nat. III. 9: 192. 1848; Diels, Pflanzenreich 26 (4^{112}): 88. 1906.

Kota-kota District: Nchisi Mountain, seepage-wet ground in *Brachystegia* woodland, 10–30 cm. high, flowers white, 1400 m., July 29, 1946, *Shortridge 17013.* Uganda to South Africa.

Drosera madagascariensis DC. Prodr. 1: 318. 1824; Diels, Pflanzenreich 26 (4^{112}): 98. 1906.

Zomba District: Zomba Plateau, several plants on a sunny seepage slope, herb 2–40 cm. high, leaf-hairs red, flower not seen, 1700 m., May 31, 1946, *16107.* Widespread in tropical Africa, also in South Africa and Madagascar.

Drosera sp.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on rocky grassland slopes, herb 15–20 cm. high, leaves reddish, flowers pink, 1900 m., June 25, 1946, *16429.*

This plant is evidently very closely allied to *D. burkeana* Planch., differing in the broader petioles which gradually expand into the laminae. In this, as well as in general appearance, it much resembles *D. natalensis* Diels, Pflanzenreich 26 (4^{112}): 93 (1906), a species previously recorded only from Natal and Pondoland. Diels separates *D. natalensis* and *D. burkeana* by seed-shape, among other things. Mr. Brass' specimens do not show fruit, and for the same reason I have been unable to check the validity of the seed-character in the very limited material of *D. natalensis* available to me. I therefore feel it wiser to leave Mr. Brass' gathering unnamed for the present, to await further material.

MYROTHAMNACEAE

Myrothamnus flabellifolia Welw. Apont. 578. 1858; Weim. Bot. Notiser 1936: 451–462. 1936.

Zomba District: Zomba Plateau, plentiful on an exposed rocky summit, bushy shrub 30–50 cm. nigh, fragrant with an odour very much like that of sandalwood oil, natives use an infusion of the leaves for bathing sick children, 1820 m., May 31, 1946, *16132.* Mlanje District: Mlanje Mountain, southwest ridge, common locally on rocks wet with seepage, shrub 1–1.5 m. high, leaves reddish, fragrant with an odour like that of sandalwood oil, 2120 m., June 28, 1946, *16506.* Kenya and Tanganyika Territory to the Transvaal and southwest Africa.

Weimarck (l.c.) recognises two subspecies in addition to typical *M. flabellifolia.* Mr. Brass' specimens would probably come under subsp. *elongata* Weim. For the present I would prefer to look upon *M. flabellifolia* as a rather variable species, but not to attempt to make subspecies for what may simply be responses to environment.

COMBRETACEAE

Terminalia sericea Burch. ex DC. Prodr. 3: 13. 1828; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 4: 20. 1900.

Kota-kota District: Kasabula's Village, scattered on open ridges, tree about 15 m. tall and 30 cm. in diameter, bark rough, foliage grey, native name (Chinyanja) napini, 1000 m., Aug. 3, 1946, *17123*. Kasungu District: Kasungu, common in *Brachystegia* woodlands, tree 10–12 m. high and 30–35 cm. in diameter, foliage greyish, grows to a much larger size on moist sandy soil, native name (Chinyanja) napini, 1000 m., Aug. 24, 1946, *17410*. Tanganyika Territory to South Africa, very variable.

Terminalia sp.

Blantyre District: Blantyre, in *Brachystegia* woodlands, tree, fruits reddish-brown, 1100 m., June 17, 1946, *16347*. Kota-kota District: Chia area, woodlands of dry lake-plain, tree 10 m. high, 480 m., Sept. 6, 1946, *17551*.

Brass 17551 is in my opinion conspecific with rather numerous specimens from Portuguese East Africa (*Kirk. s.n.*, Moramballa, etc.), Nyasaland (*Clements 137*, etc.), N. Rhodesia (*Trapnell 1464, Michelmore 609*, etc.), and S. Rhodesia (*Eyles 6394, 7653, 8588, Pardy P. 121/33*, etc.). This species is a close relative of *T. mollis* Laws., which I would look on as a widespread plant, embracing the Rhodesian *T. suberosa* R. E. Fr. and *T. rhodesica* R. E. Fr. The plant exemplified by *Brass 17551* differs from *T. mollis* in the more slender twigs, smaller leaves, young shoots more shortly tomentose, leaves rarely showing secondary lateral nerves, inflorescences normally shorter than the leaves, etc. These differences are admittedly not very much, but they seem to work with a rather wide range of material and in my view are specific; the facies of the two species is also different and to distinguish between them in the herbarium is not so difficult as it sounds; there are, however, a few specimens which may be hybrids. The other difficulty is that the differences are mostly derived from fruiting specimens, and I do not feel certain that the rather sparse flowering material is correctly correlated. What is so badly wanted, here and in other species of *Terminalia*, is collections made from the same tree at different times of year. Until workers in the field are prepared to take the extra trouble of doing this, they must be prepared for vague and uncertain identifications. I am therefore leaving Mr. Brass' specimen unnamed, in the hope that this note may stimulate somebody to collect this species adequately.

Combretum imberbe Wawra, Sitz.-Ber. Akad. Wien Math.-Naturw. 38: 557. 1859; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 3: 14. 1899.

Chikwawa District: Lower Mwanza River, plentiful in open forest of river-plains, tree to 25 m. high and 70 cm. in diameter, bark hard, deeply fissured, dark grey, leaves greyish-green, native name simbidi, 180 m., Oct. 4, 1946, *17948*. Tanganyika Territory to Bechuanaland and the Transvaal.

The varieties given by Engler and Diels (l.c.) seem to be of little worth.

Combretum gueinzii Sond. Linnaea 23: 43. 1850; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 3: 38. 1899.

Kasungu District: Kasungu Hill, occasional on dry rocky slopes, tree 7–8 m. high, native name (Chinyanja) pakasa, 1100 m., Aug. 28, 1946, *17455*. Anglo-Egyptian Sudan to South Africa.

Combretum ternifolium Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 3: 49. 1899.

Kota-kota District: Chia area, frequent in dry woodlands of lake plain, tree 8–10 m. high, wholly or partially deciduous, flowers usually appearing before the leaves, petals yellow, filaments white, native name (Chinyanja) mpakash, 480 m., Sept. 7, 1946, *17565*. Chikwawa District: Chikwawa, frequent on creek-flats in dry woodlands, tree 10–12 m. high, deciduous, now in young leaf, flowers greenish, 300 m., Oct. 5, 1946, *17978*. Tanganyika Territory to S. Rhodesia and Portuguese East Africa.

Combretum mechowianum O. Hoffm. Linnaea 43: 131. 1880–82; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 55. 1899.

Kasungu District: Kasungu, in village, tree 12 m. high and 40 cm. in diameter, attractive, with dense foliage and drooping branches, flowers greenish-white, 1000 m., Aug. 27, 1946, *17443*. Tanganyika Territory (?) to Bechuanaland.

Combretum zeyheri Sond. Linnaea 23: 46. 1850; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 59. 1899.

Kota-kota District: Kasabula's Village, common about villages, tree to 25 m. tall and 50 cm. in diameter, 1000 m., Aug. 3, 1946, *17113*. Kasungu District: Kasungu, sporadic in *Brachystegia* woodland, tree 5–6 m. high, 1000 m., Aug. 26, 1946, **17429**. Tanganyika Territory to South Africa.

Combretum transvaalense Schinz, Bull. Herb. Boiss. 2: 202. 1894; Burtt Davy, Fl. Transv. **1**: 246. 1926.

Combretum porphyrolepis Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 63. 1899.

Chikwawa District: Chikwawa, common in woodlands of stony ridges, tree 6–8 m. high, deciduous, new leaves appearing with the flowers, flowers white, 300 m., Oct. 5, 1946, *17990*. Tanganyika Territory to the Transvaal, but not previously recorded from Nyasaland.

Combretum oatesii Rolfe in Oates, Matabeleland ed. 2. 399. *pl. 10.* 1889; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 68. 1899.

Kota-kota District: Chia area, common locally in sandy woodlands of dry lake-plain, shrub about 30 cm. high, new flowering shoots now appearing after burning of the grass, flowers red, 480 m., Sept. 6, 1946, *17554*. Dedza District: Dedza, sporadic in *Brachystegia* woodland, shrub, young shoots flowering after the burning of the grass, flowers red, conspicuous, 1500 m., Sept. 13, 1946, *17634*. Southwestern Tanganyika Territory, Nyasaland, and N. and S. Rhodesia.

Combretum microphyllum Klotzsch in Peters, Reise Mossamb. Bot. 74. 1861; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 70. 1899.

Kota-kota District: Kasabula's Village, in second-growth forest, subscandent shrub 4 m. high, semideciduous, flowers red, 1000 m., Aug. 3, 1946, *17121*. Chikwawa District: Chikwawa, occasional in brushy forest of high alluvial plain, shrub 2–3 m. high, deciduous, now in young leaf, flowers red, fruit immature, 200 m., Oct. 2, 1946, *17886*.

Combretum carvalhoi ["Carvalhi"] Engl. Pflanzenw. Ost.-Afr. C: 292. 1895; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 70. 1899.

Cholo District: Cholo Mountain, in primary rain-forest, vine 20–25 m. high, leaf-midribs red beneath, 1200 m., Sept. 28, 1946, *17855*. Portuguese East Africa, and now new to Nyasaland.

Combretum mossambicense (Klotzsch) Engl. Pflanzenw. Ost.-Afr. C: 292. 1895; Engl. & Diels in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. **3**: 98. 1899.

Poivrea mossambicensis Klotzsch in Peters, Reise Mossamb. Bot. 78. 1861.

Kota-kota District: Chia area, occasional on termite mounds in dry woodlands of lake-plain, scandent shrub 5–10 m. high, petals pink, filaments white, anthers brownish-pink, style green, native name (Chinyanja) ntambi, 480 m., Sept. 6, 1946, *17558*. Chikwawa District: Chikwawa, frequent in *Acacia albida* woodland, subscandent shrub 2–4 m. high, deciduous, now coming into leaf, flowers white, 200 m., Oct. 3, 1946, *17926*. Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia.

MYRTACEAE

Syzygium cordatum Hochst. ex. Krauss, Flora 27: 425. 1844.

Kota-kota District: Nchisi Mountain, the principal tree in forests of moist gullies, tree to 16 m. tall and 50 cm. in diameter, leaves more or less glabrous, flowers greenish-white, native name (Chinyanja) mnyowi, 1300 m., Aug. 5, 1946, *17129*. Cholo District: Cholo Mountain, common in moist gullies in *Brachystegia* woodland and on edge of rain forest, tree to 10 m. high and 0.4 m. in diameter, bark thick, rough, leaves glaucous beneath, flowers white, native name (Chinyanja) nyowi, 1200 m., Sept. 26, 1946, *17825*. East and South Africa from Uganda to Natal.

Syzygium masukuēnse (Bak.) R. E. Fr. Wiss. Ergebn. Schwed. Rhod.-Kongo Exp. 1: 177. 1914.

Eugenia masukuēnsis Bak. Kew Bull. 1897: 267, 1897.

Kota-kota District: Nchisi Mountain, in rain forest, tree 10 m. high and 40 cm. in diameter, leaves yellowish beneath, flowers white, buds reddish, 1600 m., July 26, 1946, *16966*. Endemic to Nyasaland.

Syzygium guineēnse (Willd.) DC. Prodr. 3: 259. 1828.

Calyptranthes guineēnsis Willd. Sp. Pl. 2: 974. 1800.

Kota-kota District: Nchisi Mountain, common in primary rain-forest, tree 15–20 m. high and 25–30 cm. in diameter, flowers white, 1500 m., July 29, 1946, *17027*.[27b] ? District: North Road, between Mzimba and Kasungu, in *Brachystegia* woodland, tree 5–6 m. high, flowers white, 1200 m., Aug. 23, 1946, *17382*.[27b] Widespread in tropical Africa, extending into South Africa.

MELASTOMATACEAE

Osbeckia abyssinica Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 8. 1898.

Mlanje District: Likubula Gorge, occasional on moist sandy banks of river, shrub 1–2 m. high, flowers rose-pink, fruits, dry, 840 m., June 20, 1946, *16384*. Abyssinia to Nyasaland.

Antherotoma naudini Hook. f. in Benth. & Hook. Gen. Pl. 1: 745. 1867; Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 9. 1898.

Zomba District: Zomba Plateau, occasional along paths and on moist open slopes in woodlands, 10–15 cm. high, upper leaves reddish, reflexed, flowers pale pink, 1500 m., June 5, 1946, *16233*. Kota-kota District: Nchisi Mountain, plentiful on shallow seepage-wet soil in *Brachystegia* woodland, herb 5–10 cm. high, flowers purple, 1400 m., July 24, 1946, *16914*. Madagascar, and widespread in tropical Africa.

Dissotis debilis (Sond.) Triana, Trans. Linn. Soc. 28: 58. 1871; Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 14. 1898.

Osbeckia debilis Sond. Linnaea 23: 47. 1850.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 20–50 cm. high, stems usually several to many, erect from a woody base, flowers purple, 1100 m., June 18, 1946, *16383*. Kota-kota District: Kota-kota, in grass country, shrub 0.6 m. high, flowers purple, 460 m., Aug. 7, 1946, *Shortridge 17393*. Widespread in East Africa, Angola, and South Africa.

[27b] *17027* is var. *guineënse*, *17382* var. *macrocarpum* Engl. Pflanzenw. Afr. 3^2: 738 (1921), both widespread in tropical Africa, the latter in savannah.

Dissotis johnstoniana Bak. f. Trans. Linn. Soc. Bot. II. 4: 14. *pl. 2, f. 13–17.* 1894; Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 16. 1898.

Mlanje District: Mlanje Mountain, west slopes, common on open rocky slopes, shrub 1–1.5 m. high, leaves often purplish, flower deep blackish-purple, 1680 m., June 21, 1946, *16402*; Luchenya Plateau, on dry grassy edges of forest, shrub about 1.5 m. high, branches erect, numerous, leaves rugose, flowers very deep purple, 1900 m., July 7, 1946, *16716*; Chambe Plateau, common in secondary forest growths, shrub 2 m. high, leaves purplish above, pale green beneath, flowers rich dark purple, calyx and filaments red, 2000 m., July 9, 1946, *16768;* west slope, plentiful on open rocky slopes, shrub 1.5–2 m. high, flowers deep purple, very showy, 1850 m., July 18, 1946, *16861.* Portuguese East Africa and Nyasaland.

The first three cited numbers agree with the type of this species in the British Museum Herbarium in having glabrous receptacles. *Brass 16861,* however, has a few bristles round the apex of the receptacle, near the insertion of the sepals; it thus forms a transition to the following variety, and argues in favour of its being no more than a variety.

Dissotis johnstoniana Bak. f. var. **strigosa** Brenan, var. nov.

A typo differt receptaculo extra setis appressis simplicibus superne albidis basi incrassatis saepe purpurascentibus ubique satis dense munito, necnon caulis nodis et foliis longius crebriusque strigosis.

Mlanje District: Mlanje Mountain; Chambe Plateau, frequent on rocky grass slopes, shrub about 2 m. high, leaves rugose, yellowish beneath, calyx and filaments red, petals dark velvety purple, 2100 m., July 9, 1946, *16757* (TYPUS varietatis); Tuchila Plateau, shrub 1.2–2.4 m. high, 1830 m., Sept. 1901, *J. M. Purves 104* (Herb. Kew.).

The type sheet of *D. johnstoniana* has, together with the typical plant, a portion of the stem, showing receptacles, that is referable to var. *strigosa.* The new variety seems to differ from the type in a greater tendency to bristle-production, affecting most parts of the plant. Wherever the type has short bristles, there is a tendency for them to be longer and denser in the variety; and the receptacle, instead of being glabrous, is densely beset with appressed setae.

The new variety differs from *D. whytei* Baker in the laxer inflorescence, larger receptacles, and in that the receptacles are clothed with setae, not with somewhat elongate conical emergences. From *D. polyantha* Gilg it differs again in the much larger receptacles and flowers and the very different indumentum on the leaves, especially in lacking the long crisped hairs that densely clothe the lower surface of the leaves of *D. polyantha.*

Dissotis canescens (Graham) Hook. f. in Oliv. Fl. Trop. Afr. 2: 453. 1871.

Osbeckia canescens Graham, Bot. Mag. *pl. 3790.* 1840.
Osbeckia incana E. Mey. ex Walp. Repert. 5: 708. 1845–46.
Dissotis incana (E. Mey. ex Walp.) Triana, Trans. Linn. Soc. 28: 58. 1871; Gilg. in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 17. 1898.

Cholo District: Cholo Mountain, plentiful in marshy situations in *Brachystegia* woodland, shrub about 1 m. high, flowers pinkish-purple, showy, 1200 m., Sept. 26, 1946, *17821.* Widespread in southern Africa, extending north to Abyssinia and Nigeria.

Dissotis candolleana Cogn. in A. & C. DC. Monogr. Phan. 7: 373. 1891; Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 19. 1898.

Kota-kota District: Nchisi Mountain, on rocky banks of woodland stream, shrub 1 m. high, flowers purple, showy, 1400 m., July 24, 1946, *16902.* North Nyasa

District: Nyika Plateau, Nchena-chena Spur, occasional in open grassland, shrub 1–2 m. high, flowers deep purple, 1900 m. present down to 1400 m., Aug. 20, 1946, *17353*. Nchena-chena, frequent in moist situations in *Brachystegia* woodlands, shrub 1.5–3 m. high, flowers dark purple, 1340 m., Aug. 21, 1946, *17374*. Tanganyika Territory, Nyasaland, N. Rhodesia, Angola, and (fide Gilg) Cameroons.

Dissotis princeps (Bonpl.) Triana, Trans. Linn. Soc. 28: 57. 1871; Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 22. 1898.

Rhexia princeps Bonpl. Rhexies (in Humb, & Bonpl. Monogr. Melast.) 122, 123. *pl. 46.* 1823.

Zomba District: Zomba, common and very conspicuous in *Brachystegia* woodlands, shrub 1–1.5 m. high, flower rich dark purple, fruit red, 1100 m., May 26, 1946, *16034*. Zomba Plateau, in moist grassy situations and in rain-forest regrowths, common, usually gregarious, shrub 1.5–2 m. high, flowers deep rich purple, very showy, fruit red, 1500 m., June 5, 1946, *16254*. Tanganyika Territory to Natal.

Memecylon flavovirens Bak. Kew Bull. 1897: 268. 1897; Gilg in Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 2: 44. 1898.

? District: North Road between Mzimba and Kasungu, in *Brachystegia* woodlands, tree 5 m. high, leaves stiff, coriaceous, slightly convex, fruit immature, native name (Chinyanja) mnyowe, 1200 m., Aug. 23, 1946, *17381*. Tanganyika Territory, Nyasaland, N. Rhodesia, and Angola.

LYTHRACEAE

Ammannia prieuriana ["Prieureana"] Guill. & Perr. in Guill., Perr. & Rich. Fl. Senegamb. Tent. 1: 303. 1830–33; Koehne, Pflanzenreich 17 (4^{216}): 48. 1903.

Kota-kota District: Benga, west shore of Lake Nyasa, Kota-kota, occasional on sandy beaches, herb, branches flat, spreading, flowers reddish, 470 m., Sept. 2, 1946, *17488*. Chikwawa District: Lower Mwanza River, one example on a sandy beach, herb 30 cm. high, flowers red, 180 m., Oct. 4, 1946, *17969*. Widely distributed in tropical Africa.

We are indebted to the Director of the Conservatoire et Jardin Botaniques at Geneva for kindly sending on loan the type of *Ammannia prieuriana* Guill. & Perr.

Ammannia nr. **prieuriana** Guill. & Perr.

Chikwawa District: Lower Mwanza River, occasional on sandy beaches, flowers reddish, 180 m., Oct. 3, 1946, *17937*.

Very close indeed to true *A. prieuriana* but with smaller fruits and shorter calyces. I have seen a similar sheet from Portuguese East Africa (*Gomes Sousa 771*). Study in the field will be essential before the taxonomy of *Ammannia* can be put on a really sound basis.

OLINIACEAE

Olinia usambarensis Gilg, Bot. Jahrb. 19: 278. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in primary forest, tree 15 m. high and 80 cm. in diameter at breast-height, 1890 m., June 30, 1946, *16551*. Abyssinia, southward through E. Africa to Nyasaland and the Zoutpansberg in the northern Transvaal.

ONAGRACEAE

Epilobium salignum Hausskn. Oesterr. Bot. Zeitschr. 29: 90. 1879; Monogr. Gatt. *Epilobium* 236. 1884.

Epilobium neriophyllum Hausskn. Abh. Naturw. Ver. Bremen 7: 19. 1880; Monogr. Gatt. *Epilobium* 236. 1884.

Zomba District: Zomba Plateau, frequent on wet open banks of a rain-forest stream, up to 1.5 m. high, flowers white, later pink, 1500 m., June 7, 1946, *16314*. Abyssinia, southward to South Africa, westward to the British and French Cameroons and Angola; also in Madagascar.

Jussiaea erecta L. Sp. Pl. 388. 1753; Munz, Darwiniana 4: 195. 1942.

Jussiaea linifolia sensu Oliv. Fl. Trop. Afr. 2: 489. 1871; Hutch. & Dalz. Fl. W. Trop. Afr. 1: 146. 1947. excl. spec. *Brown-Lester 10*; non *Jussiaea linifolia* Vahl.

Kota-kota District: Benga, west shore of Lake Nyasa, scattered on sandy beaches, herb 50–60 cm. high, stem erect, stem and leaves reddish, flowers yellow, 470 m., Sept. 2, 1946, *17486*. Chikwawa District: Lower Mwanza River, one plant on a sandy beach, herb 1 m. high, flowers small, yellow, 180 m., Oct. 4, 1946, *17957*. Tropics of the Old and New Worlds.

Jussiaea suffruticosa L. Sp. Pl. 388 (1753) var. **brevisepala** Brenan, Kew Bull. 1953: 168. 1953.

Kota-kota District: Benga, west shore of Lake Nyasa, occasional on sandy beaches, herb, branches prostrate and spreading radially, flowers yellow, 470 m., Sept. 2, 1946, *17485*. Chikwawa District: Lower Mwanza River, uncommon on sandy river-beaches, 60–70 cm. high, flowers yellow, 180 m., Oct. 6, 1946, *18014*. The species pantropical; the variety widespread in tropical Africa.

Jussiaea abyssinica[28] (A. Rich.) Dandy & Brenan in F. W. Andrews, Flow. Pl. Anglo-Egypt. Sudan 1: 145. 1950.

Ludwigia abyssinica A. Rich. Tent. Fl. Abyss. 1: 274. 1848.

Ludwigia prostrata sensu Oliv. Fl. Trop. Afr. 2: 491. 1871; Perrier, Not. Syst. 13: 140, 141. 1947; Robyns, Fl. Spermat. Parc Nat. Albert 1: 681. 1948; nec non auct. afr. al.; non *Ludwigia prostrata* Roxb.

Isnardia prostrata sensu Hiern, Cat. Afr. Pl. Welw. 1: 381. 1898; non *Isnardia prostrata* (Roxb.) Kuntze.

Jussiaea acuminata sensu Hutch. & Dalz. Fl. W. Trop. Afr. 1: 146. 1927, pro maj. parte, excl. spec. *Vogel 72, Millen 149*; non *Jussiaea acuminata* Sw.

Mlanje District: Likubula Gorge, herb about 1 m. high, freely branched, leaves more or less fleshy, flowers yellow, about 3 mm. in diameter, 840 m., June 20, 1946, 16381. Widespread in the African tropics, extending to Natal and Madagascar.

Hitherto most workers on African botany have been content to follow Oliver's lead in identifying this plant with the Asiatic *Ludwigia prostrata* Roxb. That, however, while very similar in general appearance, differs profoundly in having the seeds free within the capsule and not encased in little pieces of endocarp like those of *Jussiaea abyssinica.* In addition, the capsules of *L. prostrata* are much more angled and sulcate longitudinally than those of *J. abyssinica*, and under a × 20 lens a very minute puberulence is visible on the *young* ovaries of *L. prostrata*, and absent from those of the other species. So far *L. prostrata* appears to be absent from Africa, and *J. abyssinica* from Asia.

Examination of herbarium specimens and floras shows that botanists have found it very difficult to separate *J. abyssinica* from African material of *J. linifolia* Vahl (*J. acuminata* auct.), probably because both plants have the seeds encased in little pieces of endocarp. Besides the difference in stamen number (4–5 in *J. abyssinica*, 8 in *J. linifolia*), there are certain characters that enable these two plants to be safely separated without dissection. In *J. abyssinica* the flowers are more or less fascicled in the leaf-axils, while in *J. linifolia* they are always solitary. There is no *fundamental* difference here; it is simply that in *J. abyssinica* the internodes of the axillary flower-bearing axes always remain short and the bracts subtending the individual flowers are normally (not quite always) scale-like; while in *J. linifolia* the internodes elongate, the flowers thus becoming spaced and solitary, and subtended by bracts which become foliaceous. In addition *J. abyssinica* has the ovaries quite glabrous, while in *J. linifolia* they are very minutely puberulous; a × 20 lens (and a good light!) are necessary for discerning this difference. The fruits of *J. abyssinica* are more or less cylindrical and equal or approximately so in diameter at top and bottom, while those of *J. linifolia* are normally distinctly wider in their upper quarter or half than below, and this upper portion is smoother and less torulose.

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[28] By J. E. Dandy [British Museum (Natural History)] and J. P. M. Brenan.

It will be seen that the transfer of *Ludwigia abyssinica* to *Jussiaea* breaks down the accepted key-character used for separating these two genera (stamens as many as sepals in *Ludwigia*, twice as many in *Jussiaea*). Most botanists would agree that the results of separation by such a character are often far from natural. But whatever the status of *Ludwigia* as a genus, it seems manifestly unnatural to separate generically, merely on account of stamen number, *Ludwigia abyssinica* and *Jussiaea linifolia*, which have in common the very remarkable way in which seed and endocarp are combined in the ripe capsule, and whose close resemblance in other features has been only too confusingly obvious.

I have examined the type of *J. abyssinica*, courteously sent on loan by the Muséum National d'Histoire Naturelle at Paris, and have found it to agree with the interpretation we have used here.

CUCURBITACEAE

Momordica fasciculata Cogn. Bull. Herb. Boiss. 5: 636. 1897; Cogn. & Harms, Pflanzenreich 88 (4$^{275\,(2)}$): 38. 1924.

Chikwawa District: Chikwawa, frequent in dry stony woodland, several shortly scandent stems produced from a large laterally flattened taproot, flowers yellow, conspicuous, 200 m., Oct. 5, 1946, *17984*. Portuguese East Africa; new to Nyasaland.

It is likely that this species is wrongly placed generically, since the ♂ flowers lack the system of basal scales found in genuine *Momordica*. Little more can be done at present, ♀ flowers, fruits and mature leaves of *M. fasciculata* being still unknown.

Momordica foetida Schumach. in Schumach. & Thonn. Beskr. Guin. Pl. 426 (1827) var. **villosa** Cogn. Bot. Jahrb. 21: 208. 1895; Cogn. & Harms, Pflanzenreich 88 (4$^{275\,(2)}$): 43. 1924.

Cholo District: Cholo Mountain, trailing on old garden land, vine with pale yellow flowers, 1200 m., Sept. 25, 1946, *17807*; ibid., trailing in old gardens, fruit immature, 1200 m., Sept. 26, 1946, *17829* , The species widespread in Africa, the variety recorded from Tanganyika Territory and Ruanda, new to Nyasaland.

Hymenosicyos sp. [cf. *H. subsericeus* (Hook. f.) Harms].

Zomba District: Zomba Plateau, one example in secondary rain-forest, vine 3 m. high, flowers yellow, fruit green, immature, 1550 m., June 7, 1946, *16315*.

Material insufficient for certain specific determination. *H. subsericeus* is known from Tanganyika Territory and Angola.

Melothria ? sp. nov. aff. *microsperma* (Hook. f.) Cogn.

Kota-kota District: Nchisi Mountain, climbing in forest opening, vine 1.5 m. high, flowers yellow, fruit to 1 cm. in diameter, globose, bluish-green (unripe), 1550 m., July 30, 1946, *17037*.

Further material of this is desired. What are probably ♂ plants of this, though the specimens are poor, were collected in July 1896 on the Masuku Plateau, Nyasaland, at 1980–2130 m. alt. by A. Whyte.

BEGONIACEAE

Begonia ? sp. nov. aff. **sutherlandi** Hook. f.

Zomba District: Zomba Plateau, one plant on a moist shady rock in rain-forest, herb 90 cm. high, one reddish stem erect from a large tuberous base, petioles and leaf-nerves red, flower pale pink, 1500 m., June 7, 1946, *16322**.

A very poor specimen collected by A. Whyte in December 1894 between 1220 and 1830 m. on Mount Malosa, Nyasaland, is probably the same as Mr. Brass' specimen.

CACTACEAE

Rhipsalis cassutha Gaertn. Fruct. **1**: 137. 1788; Britt. & Rose, Cactaceae 4: 225. 1923.

Cholo District: Cholo Mountain, common epiphyte, high on rain-forest trees, shrub, branches pendent, numerous, fleshy, up to about 80 cm. long, 1350 m., Sept. 20, 1946, *17676*; ibid., common, high epiphyte in rain-forest, shrub, branches to 80 cm. long, cylindrical, pendent, flowers 7 mm. in diameter when fully expanded, pale green, 1200 m., Sept. 26, 1946, *17824*. Nswadzi River, epiphytic on relict rain-forest trees of river-bank, shrub, branches to 1 m. long, pendent, cylindrical, green, flowers about 10 mm. in diameter, rotate, greenish-white, fruit unripe, 840 m., Sept. 27, 1946, *17842*. Widespread in the tropics of Africa and America, also found in Madagascar, Mauritius, Seychelles, and Ceylon.

FICOIDACEAE

Glinus oppositifolius (L.) A. DC. Bull. Herb. Boiss. II. **1**: 559. 1901.

Mollugo oppositifolia L. Sp. Pl. 89. 1753.
Mollugo spergula L. Syst. Nat. ed. 10. 881. 1759.

Chikwawa District: Lower Mwanza River, on sandy beaches, 180 m., Oct. 3, 1946, *s. n.* Widespread in the tropics of the Old World.

A small piece of this plant found mixed with *17931* (*Gisekia africana* var. *pedunculata*).

Gisekia africana (Lour.) Kuntze var. **pedunculata** (Oliv.) Brenan, comb. nov.

Gisekia miltus Fenzl var. *pedunculata* Oliv. Fl. Trop. Afr. 2: 594. 1871.

Chikwawa District: Lower Mwanza River, common on sandy beaches, prostrate herb, flowers yellow, 180 m., Oct. 3, 1946, *17931*; ibid., common on sandy beaches, prostrate herb, flowers yellowish-white, 180 m., Oct. 4, 1946, *17975*. Distribution at present doubtful, the species probably widespread in southern Africa.

I prefer to adopt Oliver's view of the limits of this species rather than those of Burtt Davy (Man. Fl. Pl. Transv. **1**: 153. 1926); Loureiro's description of *Miltus africana* suggests a plant with flowers fascicled at the nodes, and I find it difficult to see why it should not be the same as *G. pentadecandra* E. Mey.

UMBELLIFERAE

Alepidea gracilis[29] Dümmer, Trans. Roy. Soc. S. Afr. **3**: 11 (1913) var. **major** Weim. Bot. Notiser **1949**: 224. 1949.

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[29] Determinations by Prof. H. Weimarck, Lund University.

Mlanje District: Mlanje Mountain; Luchenya Plateau, local on wet shaded grass slopes, perennial herb 80–100 cm. high, flowers white, 2140 m., June 27, 1946, *16460.* North Nyasa District: Nyika Plateau, frequent in open grasslands, perennial herb 30–40 cm. high, roots tuberous, flowers white, bracts white above, green below, purplish with age, 2300 m., Aug. 16, 1946, *17245.* Nyasaland and S. Rhodesia to Cape Province.

Sanicula elata Ham. ex. Don, Prodr. Fl. Nepal. 183. 1825; Shan & Const. Univ. Calif. Publ. Bot. **25**^{1}: 47. 1951.

Sanicula europaea L. var. *capensis* Cham. & Schlecht. Linnaea **1**: 352. 1826.
Sanicula europaea L. var. *elata* (Ham. ex Don) Boissieu, Bull. Soc. Bot. Fr. **53**: 421. 1906; Wolff, Pflanzenreich 61 (4^{228}): 63, 278. 1913.

Zomba District: Zomba Plateau, massed on a shaded rock in a rain-forest stream, herb about 80 cm. high, flowers greenish, 1500 m., June 7, 1946, *16310.* Cholo District: Cholo, occasional in rain-forest gullies, perennial herb 60–80 cm. high, flowers white, 1100 m., Sept. 29, 1946, *17872.* Widespread on the mountains of tropical Africa, also in South Africa, Madagascar, and Asia including the Himalayas.

Shan and Constance in their recent revision of the gems *Sanicula* (l.c.) separate *S. elata* from *S. europaea* because of the few (1–4) staminate flowers in each of the ultimate umbels of the former, *S. europaea* having 12–18 staminate flowers per ultimate umbel; they also state that the highly developed dichasial branching of *S. elata* is entirely unlike that of *S. europaea.*

S. elata has up till now been usually treated as a variety of *S. europaea*, but I think that there is much to be said for separating the two specifically.

It should be noticed that if *S. elata* is treated as a variety of *S. europaea* then the correct varietal name is var. *capensis* Cham. & Schlecht., and not var. *elata* (Ham. ex Don) Boissieu.

Shan and Constance give the distribution of true *S. europaea* as northwestern Europe to the Mediterranean region and eastward to Asia Minor, Persia, the Caucasus, and western Siberia; it does not occur anywhere in tropical or South Africa.

Heteromorpha trifoliata (Wendl.) Eckl. & Zeyh. Enum. Pl. Afr. Austr. 342. 1836.

Bupleurum trifoliatum Wendl. in Bartl. & Wendl. Beitr. Bot. 2: 13. 1825.
Heteromorpha arborescens sensu Hiern in Oliv. Fl. Trop. Afr. 3: 10. 1877; Wolff, Pflanzenreich 43 (4^{228}): 33. 1910, excl. var. γ & auct. al., omn. p.p., quoad pl. afr. trop.; non *Heteromorpha arborescens* (Thunb.) Cham. & Schlecht.

Zomba District: Zomba Plateau, common on precipitous rocky slopes, tree 3–5 m. high and 6–8 cm. in diameter at breast-height, bark laminate, broken into large irregular flakes, leaves aromatic, flowers greenish, fruit not seen, 1430 m., May 29, 1946, *16078.* Mlanje District: Mlanje Mountain; Luchenya Plateau, common in brushy forest regrowths and among rocks in grassland, tree 2–4 m. high, 2100 m., June 27, 1946, *16483.* Kota-kota District: Nchisi Mountain, occasional in gullies in *Brachystegia* woodland, shrub 1–2 m. high, plant aromatic, plant stems simple, usually solitary, leaves greyish beneath, flowers yellowish-green, 1400 m., July 25, 1946, *16926.* North Nyasa District: Nyika Plateau, uncommon in secondary growths of montane forest, tree or shrub to 8 m. high, 2340 m., Aug. 20, 1946, *17342.* East and South Africa.

Brass 16926 is an aberrant form with puberulous stems and leaves, possibly worthy of separation when the limits of this polymorphic species are better known.

For a note on the reasons, with which I am inclined to agree, for using the name *H. trifoliata* rather than *H. arborescens* for this plant, see Burtt Davy, Fl. Transv. 2: 519 (1932).

My colleague, Mr. R. D. Meikle, points out an additional difficulty over *H. arborescens*. Chamisso and Schlechtendahl based this binomial on *Bupleurum arborescens* Thunb. Prodr. Fl. Cap. 50 (1794); but this is a later homonym of *Bupleurum arborescens* Jacq. Coll. Bot. 2: 343 (1788).

Pimpinella engleriana Wolff ex Norman, Jour. Linn. Soc. Bot. 47: 590. 1927.

Kota-kota District: Nchisi Mountain, moist gulley in *Brachystegia* woodland, perennial herb 150–180 cm. high, root aromatic, flowers greenish-white, 1400 m., July 25, 1946, *16933*; ibid., common locally in moist gullies in *Brachystegia* woodland, perennial herb 1–1.5 m. high, flowers white, 1400 m., July 27, 1946, *16981*. Tanganyika Territory and Nyasaland.

Pimpinella welwitschii Engl. Hochgebirgsfl. Trop. Afr. (Abh. Akad. Wiss. Berlin 1891:) 319. 1892; Norman, Jour. Linn. Soc. Bot. 47: 590. 1927.

Zomba District: Zomba Plateau, one plant on a sunny moist bank, perennial herb 110 cm. high, flowers white, 1450 m., June 5, 1946, *16229**; ibid., one example on a moist shaded bank, herb 40 cm. high, flowers white, 1500 m., June 5, 1946, *16236*. New to Nyasaland; previously only known from Angola.

Diplolophium zambesianum Hiern in Oliv. Fl. Trop. Afr. 3: 18. 1877; Norman, Jour. Bot. 61: 56, 57. 1923.

Mombera District: 10 miles N. of Mzimba, common on sandy soil in *Brachystegia* woodland, herb 100–120 cm. high, flowers cream, 1370 m., Aug. 9, 1946, *17145*. Belgian Congo, Angola, N. and S. Rhodesia, and Nyasaland.

Diplolophium buchanani (Benth. ex Oliv.) Norman, Jour. Bot. 61: 56, 57. 1923.

Physotrichia buchanani Benth. ex Oliv. Hook. Ic. Pl. *pl. 1358*. 1881.

Zomba District: Zomba Plateau, common on grassy ledges of a bluff, shrub 1.5–2 m. high, plant glaucous, stems several, simple, erect, flowers greenish-white, 1500 m., June 6, 1946, *16289*. Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent in rocky situations in grasslands, shrub 1.5–2.5 m. high, glaucous, aromatic, with several erect simple stems, flowers greenish-white, 2000 m., July 11, 1946, *16793*. Endemic to Nyasaland.

Peucedanum linderi Norman, Jour. Linn. Soc. Bot. 49: 511. 1934.

North Nyasa District: Nyika Plateau, plentiful in small opening in montane forest, herb 2.5–3 m. high, stems hollow, fleshy, flowers white, 2320 m., Aug. 16, 1946, *17237*. Kenya (?), Belgian Congo, Tanganyika Territory, and now recorded for the first time from Nyasaland.

Peucedanum nyassicum Wolff, Bot. Jahrb. 48: 282. 1912; Norman, Jour. Linn. Soc. Bot. 49: 513. 1934.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional on paths in grassland, perennial herb 30–40 cm. high, aromatic, flowers red, 1900 m., July 11, 1946, *16797*. Apparently endemic to Mlanje; until now only represented by Whyte's original gathering of 1891.

Steganotaenia araliacea Hochst. Flora 27 (Beil. 1): 4. 1844; Norman, Jour. Linn. Soc. Bot. 49: 514. 1934.

Kasungu District: Kasungu, growing among grouped small trees or in brushy patches in *Brachystegia* woodland, tree or shrub 2–3 m. high, deciduous, now leafless, flowers green, native name (Chinyanja) mboloni, 1000 m., Aug. 27, 1946, *17437*. Chikwawa District: Chikwawa, occasional in *Acacia albida* woodland, tree 5–7 m. high, deciduous, now producing leaves, flowers green, native name mpoloni, 200 m., Oct. 3, 1946, *17923*. Widespread in tropical Africa, extending south to the Transvaal.

Lefebvrea brevipes Engl. ex Wolff in Mildbr. Wiss. Ergebn. Deutsch. Zentr.-Afr. Exp. 1907-8 2: 600. 1913.

Zomba District: Zomba Plateau, tall, simple, apparently annual, aromatic herb 2-2.5 m. high, leaves bipinnate, lower ones 50-60 cm. long, one terminal compound umbel and about 3 to 6 axillary from upper nodes, 1430 m., May 30, 1946, *16083.* Tanganyika Territory to Nyasaland.

Caucalis pedunculata Bak. f. Trans. Linn. Soc. II. Bot. 4: 15. 1894.

North Nyasa District: Nyika Plateau, common locally in open grasslands, perennial herb, taproot thick, fleshy, aromatic, young flowering shoots now appearing after burning of the grass, flowers greenish, 2300 m., Aug. 11, 1946, *17175.* Kota-kota District: Chenga Hill, frequent in low open *Brachystegia* woodland, perennial herb to 40 cm. high, rootstock large, fleshy, young shoots flowering after burning of the grass, flowers yellow-green, 1600 m., Sept. 9, 1946, *17592.* Uganda to Nyasaland and S. Rhodesia.

Brass 17592 apparently represents genuine *C. pedunculata* with deltoid leaves with 4-6 pairs of pinnae and rather broad segments, while *17175* is a form with oblong leaves with numerous (8-13) pinnae and narrower segments. Intermediates occur between these extremes and, pending further observations, I prefer to treat both as forms of a single species that is variable in leaf-shape, indumentum, etc.

Caucalis incognita Norman, Jour. Bot. 72: 205. 1934.

Zomba District: Zomba Plateau, grassy, moist edge of rain-forest, herb of weak reclining habit, stem one, about 80 cm. long, flowers greenish, 1450 m., June 3, 1946, *16190.** Mlanje District: Mlanje Mountain; Luchenya Plateau, common in moist openings in forest, herb, ascending, aromatic, flowers greenish, 1820 m., July 1, 1946, *16575.* Mountains of East Africa from Abyssinia to Nyasaland.

ARALIACEAE

Schefflera polysciadia Harms in Engl. Pflanzenw. Ost-Afr. C: 297. 1895.

North Nyasa District: Nyika Plateau, epiphytic in montane forest of escarpment, shrub 2-3 m. high, stems several from a common base, long and weak, not branched, flowers and fruit purple, 2100 m., Aug. 17, 1946, *17278.* Kenya, Uganda, Belgian Congo, Tanganyika Territory, now recorded for the first time from Nyasaland.

RUBIACEAE[30]

Crossopteryx febrifuga (Afz. ex G. Don) Benth. in Hook. Niger Fl. 381. 1849.

Rondeletia febrifuga Afz. ex G. Don, Gen. Syst. 3: 516. 1834.

Crossopteryx kotschyana Fenzl in Endl. & Fenzl, Nov. Stirp. Dec. Vindob. 46. 1839; Hiern in Oliv. Fl. Trop. Afr. 3: 44. 1877.

Kota-kota District: Chia area, flood-banks of streams on lake-plain, tree 10 m. high, native name (Chinyanja) nkundanguluwe, 480 m., Sept. 3, 1946, *17518.* A variable and widely distributed species in tropical Africa.

Pentas longiflora Oliv. Trans. Linn. Soc. II. Bot. 2: 335 (1887) var. **nyassana** Scott Elliot, Jour. Linn. Soc. Bot. 32: 433. 1896.

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, only one fertile plant seen, herb 60 cm. high, flowers whitish, 1500 m., June 5, 1946, *16264**; ibid., occasional in grassy secondary growths in rain-forest clearings, herb 1 m. high, branches numerous, erect, flowers white, 1500 m., June 7, 1946, *16309*. The variety occurs in Uganda, Kenya, Belgian Congo, Tanganyika Territory, and Nyasaland.

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[30] *Agathisanthemum, Kohautia, Oldenlandia,* and *Pavetta* by Dr. C. E. B. Bremekamp, Botanisch Museum, Utrecht; *Rothmannia* and *Rubia* by A. A. Bullock, Royal Botanic Gardens, Kew; *Pentanisia* by B. Verdcourt, East African Agricultural and Forestry Research Organization, Nairobi, Kenya.

Pentas schimperiana (A. Rich.) Vatke, Linnaea 40: 192. 1876.

Vignaldia schimperiana A. Rich. Tent. Fl. Abyss. 1: 358. 1847.

North Nyasa District: Nyika Plateau, common in shrubby edges of montane forest, shrub about 1.5 m. high, corolla white, apex of lobes red, calyx-lobes red, 2350 m., Aug. 16, 1946, *17247*. Abyssinia to Nyasaland, and in the Belgian Congo.

Pentas purpurea Oliv. Trans. Linn. Soc. 29: 83. 1873.

Zomba District: Zomba Plateau, one example in *Brachystegia* woodland, perennial herb, 2 stems erect from a thick woody stock, flowers purple, 1500 m., June 6, 1946, *16281*.* Tanganyika Territory to S. Rhodesia and Portuguese East Africa.

Pentas sp. aff. **purpurea** Oliv.

Mlanje District: Mlanje Mountain; Luchenya Plateau, on grassy edges of rainforest regrowths, herb 60–100 cm. high, flowers purplish-white, 1860 m., June 26, 1946, *16447*.

This apparently equals *Adamson 347* (Herb. Kew.), collected at 2130–2440 m. alt. on Mlanje Mountain. Further specimens of this plant are wanted to clear up its relationship with the variable *P. purpurea*.

Otomeria dilatata[30a] Hiern in Oliv. Fl. Trop. Afr. 3: 50. 1877.

Kota-kota District: Nchisi Mountain, on grassy edges of forest strips in gullies, perennial herb 80–100 cm. high, stem solitary, simple or little branched, flowers scarlet, very conspicuous, 1400 m., July 25, 1946, *16930*. Widespread in tropical Africa.

Agathisanthemum globosum (Hochst. ex A. Rich.) Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48^2: 161. 1952 (errore "Klotzsch ex Hiern...").

Hedyotis globosa Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 360. 1847.
Oldenlandia globosa (Hochst. ex A. Rich.) Hiern in Oliv. Fl. Trop. Afr. 3: 54. 1877.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, not common, perennial herb 30–40 cm. high, with several stems erect from a thick rootstock, flowers purplish, 1500 m., June 6, 1946, *16279*. Abyssinia to S. Rhodesia and Nyasaland, also in the Belgian Congo, Gaboon, and Angola.

Oldenlandia fastigiata Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48^2: 260 (1952) var. **fastigiata.**

Chikwawa District: Lower Mwanza River, one example on a sandy beach, herb 30 cm. high, flowers white, 180 m., Oct. 6, 1946, *18013*. Anglo-Egyptian Sudan, Abyssinia, and Somaliland, and southward to Nyasaland.

The last-mentioned species has hitherto been confused with *Oldenlandia corymbosa* L., from which it is easily distinguishable by the subsessile inflorescences, the flowers forming dense clusters at the nodes.

Oldenlandia goreënsis (DC.) Summerh. Kew Bull. 1928: 392 (1928) var. **goreënsis;** Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48^2: 196. 1952.

Hedyotis goreënsis DC. Prodr. 4: 421. 1830.

Zomba District: Zomba Plateau, herb about 20 cm. high, flowers pale purple, fruits compressed laterally, 1500 m., June 7, 1946, *16297*. Tropical Africa, from

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[30a] The correct name for this species is now *Otomeria elatior* (A. Rich. ex DC.) Verdcourt, Bull. Jard. Bot. Brux. 23: 18 (1953) (*Sipanea elatior* A. Rich. ex DC. Prodr. 4: 415. 1830).

Senegambia through the Sudan to Abyssinia and Kenya and southwards to Angola, S. Rhodesia, and Portuguese East Africa.

Oldenlandia rupicola (Sond.) Kuntze, Rev. Gen. 293 (1891) var. **rupicola** f. **brachystyla** Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48²: 208. 1952.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on open banks of streams and in brushy forest regrowths, herb, procumbent, ascending or subscandent, flowers white, anthers blue, 1820 m., June 25, 1946, *16421;* ibid., common in grasslands, herb, flowers white, 1950 m., July 16, 1946, *16848.*[31] Tanganyika and Nyasaland, and through the mountains of Portuguese East Africa, the western part of S. Rhodesia, and the Transvaal to Natal.

Kohautia confusa (Hutch. & Dalz.) Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48²: 89. 1952.

Oldenlandia confusa Hutch. & Dalz. Fl. W. Trop. Afr. 2: 131. 1931.

Zomba District: Zomba Plateau, occasional in woodlands, slender annual herb 30 cm. high, flowers pale blue, 1430 m., May 30, 1946, *16089.* Senegambia, French Guinea, Tanganyika Territory, and Nyasaland.

Kohautia cuspidata (K. Schum.) Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48²: 74. 1952.

Oldenlandia cuspidata K. Schum. Bot. Jahrb. 23: 413. 1896.

Zomba District: Zomba Plateau, several examples on an exposed rocky crest, herb 20 cm. high, flowers dark pink, showy, 1820 m., May 31, 1946, *16129**; ibid., common on an exposed rocky summit, herb 20–40 cm. high, flowers blue to violet, showy, 1820 m., May 31, 1946, *16131.* Nyasaland to Angola and Southwest Africa.

Kohautia longifolia Klotzsch in Peters, Reise Mossamb. Bot. 297 (1861) var. **longifolia**; Bremek. Verh. Nederl. Akad. Wet. Afd. Natuurk. II. 48²: 68. 1952.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, herb 80 cm. high, leaves brownish-green, flowers violet, 1100 m., June 17, 1946, *16335.** Kotakota District: Nchisi Mountain, in *Brachystegia* woodland, uncommon, herb, flowers blue, lobes reflexed, 1400 m., July 27, 1946, *16976.* Tanganyika Territory, Nyasaland, S. Rhodesia, Portuguese East Africa to Zululand.

Mussaenda arcuata Lam. ex Poir. in Lam. Encyc. 4: 392. 1796; Wernham, Jour. Bot. 51: 274. 1913.

Zomba District: Zomba Plateau, in riverine rain-forest, common, scrambling shrub 6–7 m. high, flowers not seen, fruit unripe, 1450 m., June 4, 1946, *16208.* Widespread in tropical Africa; also in Madagascar and the Mascarenes.

Pauridiantha cf. **holstii** (K. Schum.) Bremek. Bot. Jahrb. 71: 212. 1940.

Urophyllum holstii K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 379. 1895.

North Nyasa District: Nyika Plateau, in montane-forest undergrowth, shrub 2 m. high, flowers white in bud, 2250 m., Aug. 16, 1946, *17250.**

The specimen is most probably *P. holstii,* but since it is only in young bud, it is wise not to be too confident about the identification, especially as *P. holstii* has hitherto been known only from Kenya and Tanganyika Territory, possibly Uganda too.

Leptactina benguelensis (Welw. ex Benth. & Hook.) Good, Jour. Bot. 64 (suppl. 2): 9. 1926.

Heinsia benguelensis Welw. ex Benth. & Hook. Gen. Pl. 2: 77. 1873.

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[31] *Brass 16848* has not been seen by Dr. Bremekamp.

Kota-kota District: Chia area, in dry brushy forest on banks of waterholes on lake plain, shrub, prostrate, radiating branches forming mats a metre or more wide, buds only, 480 m., Sept. 5, 1946, *17537*. Tanganyika Territory to Angola and the Transvaal.

Rothmannia fischeri (K. Schum.) Bullock in Oberm. Ann. Transv. Mus. **17**: 224. 1937.

Gardenia fischeri K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 380. 1895.

Cholo District: Cholo Mountain, substage layer of rain-forest, tree 10 m. high, very beautiful, flowers cream-coloured, streaked and flecked with red, fragrant, native name (Chinyanja) nandua, 1100 m., Sept. 26, 1946, *17832*. Mlanje District: Mlanje, rain-forest on bank of a stream, tree 6 m. high, flowers cream flecked with reddish-brown, fragrant, fruit hard, globose, about 4 cm. in diameter, native name (Chinyanja) mandigodia, 750 m., Sept. 30, 1946, *17881*. Eastern tropical Africa, southwards to S. Rhodesia; also in the Mascarenes.

Gardenia subacaulis Stapf & Hutch. Jour. Linn. Soc. Bot. 38: 420. 1909.

Kasungu District: Kasungu, locally gregarious in *Brachystegia* woodlands, shrub 12–15 cm. high, short leafy shoots produced from branched, horizontal, underground stems (habit of *Geobalanus*), fruit 5–7 cm. long and 4–5 cm. in diameter, erect, softish when ripe, ovoid, yellowish-brown, native name (Chinyanja) mpuguso, 1000 m., Aug. 28, 1946, *17456*. N. Rhodesia, Nyasaland, and Portuguese East Africa.

Gardenia imperialis[32] K. Schum. Bot. Jahrb. 23: 442. 1896.

Kota-kota District: Nchisi Mountain, occasional in gullies in *Brachystegia* woodland, tree about 8 m. high and 25 cm. in diameter at breast-height, dry flowers only, still very fragrant, in pairs, fruit immature, 1400 m., July 27, 1946, *16977*. Widespread in tropical Africa.

Oxyanthus sp. nr. **swynnertonii** S. Moore, Jour. Linn. Soc. Bot. 40: 82. 1911.

Cholo District: Cholo Mountain, frequent in rain-forest undergrowth, shrub 2–3 m. high, fruit ovoid, 25 mm. long and 17 mm. in diameter, soft, orange-yellow, 1400 m., Sept. 27, 1946, *17839**.

This differs from *O. swynnertonii* in that the leaves are smooth, not scabrid beneath, and rather more narrowed to the base. Further collection and investigation are wanted.

Galiniera coffeoides Del. Ann. Sci. Nat. II. **20**: 92. *pl. 1, f 5.* 1843.

North Nyasa District: Nyika Plateau, on edge of montane forest, tree 8 m. tall, young leaves reddish, buds only, 2250 m., Aug. 16, 1946, *17270*. Abyssinia to Tanganyika Territory; new to Nyasaland.

Tricalysia nyassae Hiern in Oliv. Fl. Trop. Afr. **3**: 121. 1877.

Kota-kota District: Chia area, on bank of a waterhole in dry woodland of lake-plain, tree 8 m. high, sap slightly milky, flowers pink, 480 m., Sept. 3, 1946, *17519*. Tanganyika Territory, Belgian Congo, N. Rhodesia, Nyasaland, and Portuguese East Africa.

Tricalysia cf. **acocantheroides** K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 382. 1895.

North Nyasa District: Nyika Plateau, in undergrowth of juniper forest, shrub 2.5 m. tall, fruit orange-yellow, 2250 m., Aug. 11, 1946, *17153*.

T. acocantheroides is apparently endemic to Nyasaland. Flowering material is desired for certain identification.

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[32] Determination confirmed by Mr. A. A. Bullock.

Tricalysia jasminiflora (Klotzsch) Benth. & Hook. ex Hiern in Oliv. Fl. Trop. Afr. 3: 124. 1877.

Rosea jasminiflora Klotzsch, Monatsber. Preuss. Akad. Wiss. 1853: 502. 1853. (not seen; ref. from Peters, Reise Mossamb. Bot. 2: 293. 1861.)

Chikwawa District: Chikwawa, one example in *Acacia albida* woodland, shrub 1.5 m. high, branches several, erect, flowers greenish-white, 200 m., Oct. 3, 1946, *17917*. Nyasaland and Portuguese East Africa.

Tricalysia pachystigma K. Schum. Bot. Jahrb. 33: 347. 1903.

Kota-kota District: Nchisi Mountain, frequent among rocks in *Brachystegia* woodland, tree 4–6 m. high, 1400 m., July 26, 1946, *16953*.

Pentanisia schweinfurthii Hiern in Oliv. Fl. Trop. Afr. 3: 131. 1877; Verdcourt, Bull. Jard. Bot. Brux. 22: 254. 1952.

Zomba District: Zomba Plateau, common on hard open ground in woodlands, 10–15 cm. high, the thick rather fleshy stock goes deep into the ground, flowers blue, very attractive, 1400 m., May 28, 1946, *16042*. Kota-kota District: Nchisi, occasional on hard bare ground, perennial herb about 10 cm. high, flowers blue, 1400 m., Aug. 1, 1946, *17081**; ibid., in *Brachystegia* woodlands, perennial herb 15–30 cm. high, young shoots flowering after burning of the grass, flowers bright blue, 1350 m., Sept. 9, 1946, *17575*. Belgian Congo, Anglo-Egyptian Sudan, Uganda, Kenya, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, Angola, and Nigeria (Bauchi Plateau).

This species is widespread and common on elevated grasslands liable to firing, or in open grassland. It is not the same as *P. prunelloides* (Klotzsch ex Eckl. & Zeyh.) Walp. or any of its varieties.

Polysphaeria lanceolata Hiern in Oliv. Fl. Trop. Afr. 3: 128 (1877) **var. pedata** Brenan, **var. nov.**

Inflorescentiis plerumque manifeste pedunculatis, pedunculis circiter 5–18 mm. longis.

PORTUGUESE EAST AFRICA: Moçambique Province, Manica & Sofala District; Lower Umswirizwi River, an evergreen shrub with white flowers, 300 m., 1905, *C. F. M. Swynnerton 74* (Herb. Kew.). Zambesia Province, Quelimane District: Lugela-Mocuba, Namagoa estate, a large bush or shrub growing along streams, attractive, with large waxy-white flowers and dark green shining leaves, common, 60–120 m., Nov. 1944, *Mrs. H. G. Faulkner* (Herb. Kew.); ibid., Aug. 15, 1949, *Mrs. H. G. Faulkner* (Herb. Kew.); ibid., a large bush growing by streams, common, flowers creamy-white, Dec. [without year], *Mrs. H. G. Faulkner* (TYPUS varietatis in Herb. Kew.).

NYASALAND: Cholo District: Cholo, common in undergrowth of rain-forests, tree 3–5 m. high, fruit subglobose, fleshy, black, 1100 m., Sept. 29, 1946, *17874*.

All the gatherings made by Mrs. Faulkner are under the same number, 222. The last-cited and type-gathering consisted of two sets of specimens, one set with inflorescences sessile or shortly pedunculate (the peduncle up to about 4 mm. long) and resembling, except for greater robustness, ordinary *P. lanceolata*; the other set with all or nearly all the inflorescences pedunculate (the peduncle 5–18 mm. long). With dissection I can find no other difference between these plants, and I am compelled to consider the ones with pedunculate inflorescence as no more than a variety of *P. lanceolata*.

Mrs. Faulkner writes on the two sets mentioned above: "Both types from same area of river, but different plants. I have not observed the two types on one plant, but the types often grow close together; they appear to be equally common."

This of course means that S. Moore's sections of *Polysphaeria*, *Ephedranthae* and *Cladanthae*, based on whether the inflorescence is sessile or pedunculate (see Jour. Linn. Soc. Bot. 37: 307. 1906) are untenable. I had up till now adopted them as series (see Kew Bull. 1949: 85. 1949).

I much suspect that *P. zombensis* S. Moore, Jour. Linn. Soc. Bot. 37: 306. *pl. 13.* (1906) is synonymous with *P. lanceolata* var. *pedata*, but the leaves are rounded-based in *P. zombensis*, and I would like to see more material from Nyasaland before sinking it.

Swynnerton 74 was cited, together with *1269*, in Jour. Linn. Soc. Bot. 40: 87 (1911) under *P. pedunculata* K. Schum. I have examined the type-specimens of the latter, and they clearly differ from *P. lanceolata* var. *pedata* in having a much larger calyx, irregularly cleft after anthesis.

Polysphaeria cf. dischistocalyx Brenan, Kew Bull. 1949: 81. 1949.

Kota-kota District: Chia area, occasional on banks of streams in woodlands of lake plain, shrub 3–4 m. high, fruits red when ripe, 480 m., Sept. 3, 1946, *17511*.

The determination is uncertain without good calyces. *P. dischistocalyx* is confined to Tanganyika Territory and Nyasaland.

Heinsenia diervilleoides K. Schum. Bot. Jahrb. 23: 454. 1897.

Heinsenia sylvestris S. Moore, Jour. Linn. Soc. Bot. 40: 85. 1911.

Cholo District: Cholo Mountain, frequent in rain-forest, tree up to 15 m. high and to 20 cm. in diameter at breast-height, young leaves red, leaf-nerves whitish above and beneath, flowers white, 1300 m., Sept. 20, 1946, *17680*. Uganda and Kenya to S. Rhodesia; new to Nyasaland.

The alleged differences between *H. sylvestris* and *H. diervilleoides* given by S. Moore seem to me neither constant nor of specific value. In his key to the species S. Moore (*op. cit.*, 87) contrasts the breadth of the narrow basal part of the corolla-tube in these two species—5 mm. in *H. diervilleoides*, 1.2 mm. in *H. sylvestris*. An excellent isotype specimen of *H. diervilleoides* at Kew shows the basal part of the tube (in the dried state) about 0.75 mm. in diameter, and S. Moore certainly made some mistake over his measurement.

Rytigynia sp.

Kota-kota District: Nchisi Mountain, among rocks in *Brachystegia* woodland, tree 3–6 m. high, fruits more or less fleshy, black when ripe, 1400 m., July 26, 1946, *16952*.

This plant has not been exactly matched; the material is insufficient. In facies it somewhat resembles *R. dasyothamnus* (K. Schum.) Robyns from the Cameroons, but that species has long appendages to the corolla-lobes, while Mr. Brass' plant, as far as can be judged from immature buds, lacks them.

Canthium gueinzii Sond. Linnaea 23: 54. 1850; Bullock, Hook. Ic. Pl. *pl. 3170.* 1932; Kew Bull. 1932: 368. 1932.

Mlanje District: Mlanje Mountain; Luchenya Plateau, one example in forest edge, shrub 3 m. high, subscandent, fruits unripe, 1890 m., July 14, 1946, *16833*. Uganda to South Africa.

Canthium zanzibaricum Klotzsch in Peters, Reise Mossamb. Bot. 2: 291. 1861; Bullock, Kew Bull. 1932: 373. 1932.

Kasungu District: Kasungu, frequent in bushy banks of streams in *Brachystegia* woodlands, subscandent shrub up to 10 m. high, flowers yellow, fragrant, native name (Chinyanja) kachambe, 1000 m., Aug. 24, 1946, *17412*. Kota-kota District: Chia area, frequent on banks of waterholes on dry lake-plain, subscandent shrub 6–8 m. high, flowers white, native name (Chinyanja) mtutu, 480 m., Sept. 5, 1946, *17540*. Uganda to Nyasaland, N. Rhodesia, and Angola.

Canthium captum Bullock, Kew Bull. 1932: 376. 1932.

Mlanje District: Mlanje Mountain; Likubula-Tuchila Divide, in primary forest undergrowth, tree 3–4 m. high, sap not milky, fruit unripe, 2100 m., July 9, 1946, *16771.* Tanganyika Territory, and probably Uganda also; now recorded for the first time from Nyasaland.

Craterispermum laurinum (Poir.) Benth. in Hook. Niger Fl. 411. 1849.
Coffea laurina Poir. in Lam. Encyc. Suppl. 2: 14. 1811.

Kota-kota District: Chia area, common on banks of waterholes on dry lake-plain, tree 6–8 m. high, flowers white, fragrant, 480 m., Sept. 5, 1946, *17542.* Widespread in tropical Africa and very variable.

Pavetta lasiobractea K. Schum. Bot. Jahrb. 30: 415. 1901; Bremek. Repert. Sp. Nov. 37: 140. 1934.

North Nyasa District: Nyika Plateau, in montane forest undergrowth, shrub about 1 m. high, leaves stiff, midrib and nerves whitish, fruit unripe, laterally compressed, 2300 m., Aug. 13, 1946, *17202*; ibid., in montane forest undergrowth, shrub 2 m. high, fruit unripe, 2250 m., Aug. 16, 1946, *17271.* Tanganyika Territory and Nyasaland.

Coffea ligustroides S. Moore, Jour. Linn. Soc. Bot. 40: 94. 1911; A. Cheval. Caféiers 2: *pl.* 69. 1942; 3: 220. 1947.

Cholo District: Cholo Mountain, frequent in rain-forest undergrowth, tree 3–4 m. high, flower-buds only, fruit red, fleshy, compressed-ovoid, about 12 × 9 mm., 1300 m., Sept. 20, 1946, *17688.* Nyasaland, Portuguese East Africa, and S. Rhodesia.

Psychotria sp. nr. kirkii Hiern in Oliv. Fl. Trop. Afr. 3: 206. 1877.

Mlanje District: Likubula Gorge, in rocky bed of river, shrub 40 cm. high, fruit soft, red, fleshy, 840 m., June 20, 1946, *16368.*

Practically glabrous and narrower-leaved than usual. Further material is wanted.

Psychotria sp.

Kota-kota District: Nchisi Mountain, common on rocks in *Brachystegia* woodland, shrub 1–1.5 m. high, flowers cream-coloured, usually sterile, 1400 m., July 27, 1946, *16983.*

The specimen is insufficient for exact naming.

Psychotria sp. ?

North Nyasa District: Nyika Plateau, in undergrowth of montane forest, tree 5–6 m. high, 2250 m., Aug. 16, 1946, *17253.*

The flowers are all galled and badly malformed. It is possibly a *Grumilea*, but is not matched in either genus at Kew.

Grumilea sp. nr. kirkii Hiern in Oliv. Fl. Trop. Afr. 3: 206. 1877.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in rain-forest undergrowth, tree 5–6 m. high, fruit unripe, 1890 m., June 30, 1946, *16541.*

This specimen is extremely close vegetatively to *G. kirkii*, but the fruits are on much longer and more slender pedicels. Further collections, including the flowers, are wanted.

Geophila repens (L.) Johnst. Sargentia 8: 281, 282. 1949.
Rondeletia repens L. Syst. Nat. ed. 10. 2: 928. 1759.
Psychotria herbacea Jacq. Enum. Pl. Carib. 16. 1760.
Psychotria herbacea L. Sp. Pl. ed. 2. 245. 1762.
Geophila uniflora Hiern in Oliv. Fl. Trop. Afr. 3: 221. 1877.
Geophila herbacea (L.) K. Schum. in Engl. & Prantl, Nat. Pflanzenf. 4^4: 119. 1891.

Cholo District: Cholo Mountain, creeping on ground in primary rain-forest, herb, fruits red, fleshy, ovoid-globose, about 8 mm. long and 7 mm. in diameter, 1200 m., Sept. 20, 1946, *17657**; ibid., in rain-forest, creeping herb, fruits red, fleshy, 1200 m., Sept. 23, 1946, *17770**. Tropics of the Old and New Worlds; not previously recorded from Nyasaland.

Hitherto *Geophila uniflora* Hiern has been treated as a distinct species endemic to tropical Africa, but I am quite unable to see any reason for keeping it apart from *G. repens,* which has a wide distribution in the tropics of the Old and New Worlds. The alleged stipule-difference mentioned by K. Schumann (l.c.) as separating the African plants from those elsewhere I am unable to confirm.

The African plant is not always one-flowered as its epithet might imply, for *Brass 17657* shows a pair of fruits on one peduncle, and I have seen the same thing on another African specimen.

I. M. Johnston (l.c.) has pointed out that *Rondeletia repens* provides the earliest epithet for this species.

K. Schumann indirectly based his *Geophila herbacea* on *Psychotria herbacea* L. (1762), without realising that Jacquin had published the same latter name two years earlier. Linnaeus, however, although he knew of Jacquin's work (see the bibliography at the start of that edition of the *Species plantarum*), does not mention it under *P. herbacea,* and it was probably published too late to be used in the main text. There is thus no evidence that *P. herbacea* L. was based on *P. herbacea* Jacq., but rather on the reference to Pătrick Browne, Hist. Jam. 161 (1756), whence also the epithet was very probably derived. Jacquin, however, does not mention Patrick Browne under his *P. herbacea,* although he certainly made use of his book, and the type of Jacquin's *P. herbacea* may be taken to be a plant collected by Jacquin himself in the West Indies. *P. herbacea* L. and *P. herbacea* Jacq. are thus based on different types, and although taxonomically they are the same, nomenclaturally they are not. *Geophila herbacea* (L.) K. Schum. is therefore based on a later homonym. The citation of *G. herbacea* (Jacq.) K. Schum., used by Spencer Moore in Fawcett & Rendle, Fl. Jam. **7**: 111 (1936), and also by I. M. Johnston (l.c.), is not legally permissible, although, as happens not infrequently in such circumstances, it makes a strong appeal to our reason and common-sense. The earlier *P. herbacea* Jacq. could not be re-established under *Geophila* since the result would be a later homonym of *Geophila herbacea* (L.) K. Schum. Names can thus kill one another and a bad name may make a good one unusable.

Geocardia has been proposed by Standley in Contr. U. S. Nat. Herb. 17: 445 (1914) as a substitute for *Geophila* D. Don (1885), non Berg. (1803). The well-known name *Geophila* D. Don should if necessary certainly be conserved.

I am very grateful to my colleague, Mr. H. K. Airy-Shaw, for help over the nomenclature of this species.

Paederia foetens (Hiern) K. Schum. in Engl. & Prantl, Nat. Pflanzenf. 4^4: 125. 1891.

Siphomeris foetens Hiern in Oliv. Fl. Trop. Afr. 3: 229. 1877.

Kota-kota District: Nchisi, common on forest second-growths, vine 3–4 m. high, foetid, flowers yellowish, native name (Chinyanja) ntuvituvi, 1100 m., Aug. 3, 1946, *17120*.

Galopina circaeoides Thunb. Diss. Acad. **1**: 4. 1781.

Zomba District: Zomba Plateau, several plants on an open bank in riverine rain-forest, herb up to about 80 cm. high, stem solitary, ascending, flowers green, 1500 m., June 7, 1946, *16295*. Previously known from S. Rhodesia and Portuguese East Africa down to South Africa; new to Nyasaland.

Anthospermum herbaceum L. f. Suppl. 440. 1781.

Anthospermum lanceolatum Thunb. Prodr. Fl. Cap. 32. 1794.

Zomba District: Zomba Plateau, common in grassy rain-forest regrowths, herb, scrambling to a height of 2 m., flowers greenish, 1450 m., June 3, 1946, *16189*. Kota-kota District: Nchisi Mountain, scrambling in brushy edges of rain-forest, shrub 1.5 m. high, flowers greenish, 1400 m., Aug. 2, 1946, *17107*. Tanganyika Territory and the Belgian Congo to South Africa.

Anthospermum welwitschii Hiern, Cat. Afr. Pl. Welw. 2: 500. 1898.

Mlanje District: Mlanje Mountain, southwest ridge, among rocks on summit, shrub 2 m. high, stems usually solitary and erect, bearing numerous short branches at summit, flowers greenish, plant almost past flowering, 2400 m., June 28, 1946, *16494**; ibid., among rocks on summit, shrub 2 m. high, ♀ of *16494*, 2400 m., June 28, 1946, *16495*; ibid., edge of stunted forest in gulley, shrub 2 m. high, ♀, 2120 m., June 28, 1946, *16515*; ibid., southwest slope, edges of stunted forest in gully, ♂ shrub 2 m. high, flowers dioecious, green, red in bud, 2120 m., June 28, 1946, *16519*.* Previously known from Angola only; now new to Nyasaland.

Anthospermum whyteanum Britten, Trans. Linn. Soc. II. Bot. 4: 16. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on rocks of open slopes, shrub 1–2 m. high, branches few, erect, flowers yellowish, 1900 m., June 25, 1946, *16430*. Nyasaland, Portuguese East Africa, N. (?) and S. Rhodesia.

This has been compared with the type of *A. whyteanum*, *Whyte 48* from Mlanje, now in the herbarium of the British Museum. The main characters of this plant are the unicuspidate stipules, the shortly patent-hispid or patent-pilose stems and the pubescent leaves. I have no evidence for the occurrence of this species in Tanganyika Territory, and records from there are probably due to misidentification of *A. usambarense* K. Schum.

Anthospermum usambarense K. Schum. Bot. Jahrb. 28: 112. 1899.

North Nyasa District: Nyika Plateau, common in grassland edging montane forest, ♂ shrub 60–100 cm. high, erect, sparsely branched, flowers whitish, 2320 m., Aug. 16, 1946, *17265*; ibid., common in grassland near borders of montane forest, ♀ shrub to 1.5 m. tall, pistillate plants commonly taller and more robust than staminate, flowers greenish, 2320 m., Aug. 16, 1946, *17268*; ibid., in grassland shrubberies, ♀ shrub 1 m. high, flowers green, 2400 m., Aug. 18, 1946, *17318*. Anglo-Egyptian Sudan to Tanganyika Territory and the Belgian Congo; new to Nyasaland.

Borreria dibrachiata (Oliv.) K. Schum. (errore "Oliv.") in Engl. & Prantl, Nat. Pflanzenf. 4^4: 144. 1891.

Spermacoce dibrachiata Oliv. Trans. Linn. Soc. 29: 87. 1873.

Zomba District: Zomba Plateau, common amongst grass in woodlands, perennial herb 50–70 cm. high, with several stems erect from a thick woody rootstock, flowers purple, showy, calyx-lobes red, 1430 m., May 30, 1946, *16085*. Uganda to S. Rhodesia and Portuguese East Africa.

Rubia longipetiolata Bullock, Kew Bull. 1932: 497, 1932.

Mlanje District: Mlanje Mountain, brushy rain-forest regrowths, vine, scrambling to 2 m., fruit somewhat fleshy, pale green, 1700 m., June 24, 1946, *16407**; ibid., west slope, vine, scrambling to a height of 2 m. in second-growth forest, fruits blackish-purple when ripe, fleshy, 1650 m., July 18, 1946, *16859*. Kota-kota District: Nchisi Mountain, trailing amongst rocks in *Brachystegia* woodland, perennial herb, stems less than 1 m. long, fruit fleshy, black, 1500 m., July 26, 1946, *16949*. Widespread in eastern and central tropical Africa, southward to N. Rhodesia.

Galium chloroïonanthum K. Schum. Bot. Jahrb. 30: 417. 1901.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in forest regrowths, scrambling to a height of 1 m., flowers green, 1850 m., July 1, 1946, *16574*. Anglo-Egyptian Sudan, Uganda, Tanganyika Territory, Belgian Congo, and now new to Nyasaland.

Galium stenophyllum Bak. Kew Bull. 1895: 68. 1895.

Dedza District: Dedza, in moist depressions in *Brachystegia* woodland, perennial herb, branches numerous, subprostrate, young shoots flowering after the burning of the grass, flowers white, 1500 m., Sept. 13, 1946, *17633*.

This is the true *G. stenophyllum* Baker, with which the following species has been consistently confused. *G. stenophyllum* is found in SW. Tanganyika Territory and the adjacent part of N. Rhodesia, and is now recorded from Nyasaland for the first time. Although Baker in describing his species referred to it a Nyasaland specimen *(Buchanan 770)*, I do not consider this to be the same species as the rest of the specimens he mentioned, but the following species, *G. bussei*.

Galium stenophyllum may be separated from the following species by its more flaccid appearance, by the leaves which are obtuse to acute at apex but lack the distinct and long-attenuate acumen of the following species, by the widely spaced partial inflorescences, the inflorescences themselves, however, being compact, by the short, not filiform pedicels which become deflexed and arcuate after flowering, and by the large cocci of the fruit. I suspect that *G. stenophyllum* has white flowers while the following species has greenish-yellow to pale yellow flowers, but the evidence is rather conflicting at the moment.

Galium bussei K. Schum. & K. Krause, Bot. Jahrb. 39: 571 (1907) **var. glabrum** Brenan, var nov. (vide infra).

Zomba District: Zomba Plateau, in tall grass under shade of trees in *Brachystegia* woodland, perennial herb 60–70 cm. high, flowers not seen, fruits slightly fleshy, 1430 m., May 30, 1946, *16080*. Kota-kota District: Nchisi Mountain, one specimen in *Brachystegia* woodland, perennial herb 20 cm. high, flowers cream-coloured, fruits immature, 1400 m., Aug. 5, 1946, *17135**. For distribution see below.

G. bussei has been very generally misidentified with *G. stenophyllum;* for the distinction see under the latter species. Baker, indeed, with his original description of *G. stenophyllum*, cited a Nyasaland specimen, *Buchanan 770* (Herb. Kew.), which I consider referable to *G. bussei*, thus not conspecific with Baker's other cited specimens. I am grateful to Mr. P. J. Greenway, Botanist, East African Agriculture and Forestry Research Organisation, who kindly had two sheets of *Busse 941*, isotypes of *G. bussei*, sent to me on loan.

Under *G. bussei* the following four varieties may be recognised:

Galium bussei var. bussei.

Inflorescentiae satis densae et multiflorae; pedicelli breves, post anthesin horizontales vel saepe deflexi; caules et folia plus minusve pubescentia.

The var. *bussei* is known from Tanganyika Territory (*Ward U 24, Davies D 357, St. Clair Thompson 502, Mr. & Mrs. Hornby 452, Burtt 1246, Busse 941* from Mgaka Valley, the type of the species), Nyasaland (*Buchanan 770, Whyte s.n.*: Kondowe to Karonga, *Mrs. Faulkner, Kew No. 202*), and S. Rhodesia *(Eyles 723)*.

Galium bussei var. glabrum Brenan, var. nov.

Caules et folia glabra, aliter ut in var. *bussei*.

The var. *glabrum* is known from Tanganyika Territory (*Burtt 2728* [TYPUS varietatis in Herb. Kew.: Ufiume Mountain, E. aspect, alt. 1680–1830 m.; Jan. 1, 1930; common pale yellow flowered tufts], *Haarer 1827, Lynes, Dabaga 16, Lynes*

1.4.93, Davies D 957, Emson 502), Nyasaland *(Buchanan 67, 1358, Purves 62, Brass 16080, 17135),* N. Rhodesia *(Eyles 8345),* and S. Rhodesia *(Cecil 127, 217, Eyles 7092)*

Galium bussei var. strictius Brenan, var. nov.

Inflorescentiae quam in var. *bussei* plerumque laxiores et diffusiores, saepe pauciflorae; pedicelli saepe longiores, erecti vel erecto-patentes, post anthesin haud deflexi; caules et folia plus minusve pubescentia.

The var. *strictius* is known from Nyasaland *(Purves 59* [TYPUS varietatis in Herb. Kew.: Zomba, alt. 885 m., Dec. 1900]) and N. Rhodesia (*Cruse 456* from Mufulira).

Galium bussei var. glabrostrictius Brenan, var. nov.

Caules praeter nodos et folia glabra, aliter ut in var. *strictio*.

The var. *glabrostrictius* is known from the Belgian Congo *(Kassner 2292, Robyns 1695)*, Tanganyika Territory *(Michelmore 958, 1051)*, Nyasaland (*Scott s.n.* : Blantyre, *Whyte s.n.* : Zomba, 1896, *Whyte s.n.* : Mount Malosa, *Adamson 146, Cameron 11, Scott Elliot 8643*) and N. Rhodesia (*Carson s.n.* : Fwambo, 1889, *Kassner 2264, Milne-Redhead 3214, Milne-Redhead 4283* [TYPUS varietatis in Herb. Kew.: Just N. of Matonchi Farm in *Brachystegia* woodland, Jan. 22, 1938; fruits yellow-green]).

G. bussei is in addition variable in the length of its stem and internodes. Intermediates occur between the four varieties defined above, and it is therefore sometimes hard to name certain specimens. There are, in general, two inflorescence-types exemplified by var. *bussei* and var. *strictius*, each of which may be hairy or glabrous. Judging from mixed gatherings, hairy and glabrous plants grow together sometimes. All the specimens cited above, except *Busse 941*, are in Herb. Kew. *G. bussei* differs from *G. mollicomum* Bullock by the much longer internodes and leaves.

Galium scabrellum K. Schum. Bot. Jahrb. 28: 113. 1899.

North Nyasa District: Nyika Plateau, common in open grasslands, perennial herb 30–50 cm. high, dry flowers and fruits from plants partly killed back by early frosts, 2340 m., Aug. 19, 1946, *17333*; ibid., Nchena-chena Spur, occasional in open grasslands, herb, stems to 1 m. long, weak, spreading and scrambling, 2000 m., Aug. 20, 1946, *17349*. Belgian Congo, Uganda, Tanganyika Territory, Nyasaland, and S. Rhodesia.

Galium scabrellum seems, since the time of its publication, to have been completely neglected; one of the main reasons for this is that a strange error seems to have been made about its type. K. Schumann based *G. scabrellum* on a single specimen: "Nyasaland: zwischen dem See und dem Tanganjika-See auf dem Nyika-Plateau zu 2000 und 2300 m (CARSSON)" [*sic*]. No number or date is given. "Carsson" is clearly a misspelling of Alexander Carson's surname, and his specimens are at Kew, and hence an isotype of *G. scabrellum* might be expected there too. However, none of Carson's specimens agrees at all either with the description of *G. scabrellum* or the locality; and I can find no evidence that Carson ever collected on the Nyika Plateau or indeed anywhere in Nyasaland. On the other hand there is at Kew a specimen collected by Whyte from "Nyika Plateaux. 6000–7000 ft. June 1896"; the number 269 has been roughly pencilled on the label. This specimen agrees well with the description of *G. scabrellum*; and, as can be seen, with the type-locality, and is the only one at Kew that agrees in these two points. Whyte's signature on the label is a shockingly illegible scrawl, only to be identified by a knowledge of his writing elsewhere. I feel morally sure that a duplicate of this specimen was the basis for *G. scabrellum* and that by some error of reading or transcription the collector was wrongly given as Carson. I therefore propose that, unless further evidence appears, *Whyte 269* in the Kew Herbarium be accepted as an isotype of *Galium scabrellum* K. Schum.

G. scabrellum, as here interpreted, is a yellow-flowered species, closely related to *G. mollicomum* Bullock, differing in its climbing or rambling growth with elongate stems, broader leaves with ± close reflexed teeth (in *G. mollicomum* the teeth are often absent but if present are ascending), and the diffuse inflorescence.

DIPSACACEAE[33]

Scabiosa columbaria L. Sp. Pl. 99. 1753; Hiern in Oliv. Fl. Trop. Afr. 3: 252. 1877.

Zomba District: Zomba Plateau, common in *Brachystegia* woodlands, herb 70 cm. high, only one plant found in flower, flowers purple, 1500 m., June 6, 1946, *16285**. Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb 35–40 cm. high, flowers white, 1600 m., Sept. 9, 1946, *17593**. The species, taken in a wide sense, in Europe, Asia, and N. Africa, extending southward through tropical Africa to the Cape.

Mr. B. L. Burtt considers that both these specimens are best called *S. columbaria*, in a wide sense. It is a very widespread and protean species so that, not surprisingly, these African representatives look different from the more familiar plant of Britain. No doubt it will prove possible to assign them to geographical varieties or subspecies, but first it will be necessary to study how the species as a whole varies.

COMPOSITAE[34]

Volkensia ripensis Hutch. Botanist in Southern Africa 508. 1946.

Kota-kota District: Nchisi Mountain, occasional in swampy rain-forest of a gully, herb 2.5 m. high, stems simple, erect, flowers pale purple, 1400 m., Aug. 2, 1946, *17101*. Nyasaland and N. Rhodesia.

Erlangea milanjiensis S. Moore, Jour. Bot. 46: 157. 1908.

Mlanje District: Mlanje Mountain, southwest ridge, edges of stunted forest in a gully, shrub 1.5 m. high, with several stems erect from a common base, flowers purple, 2120 m., June 28, 1946, *16518*; Luchenya Plateau, occasional among sheltering rocks in grasslands, shrub 1.5 m. high, branches few, erect, flowers purple, 2150 m., July 9, 1946, *16747*; ibid., frequent among sheltering rocks in grasslands, shrub 1–1.5 m. high, flowers pale purple, 2150 m., July 11, 1946, *16787*. Endemic to Mlanje Mountain.

Erlangea marginata (Oliv. & Hiern) S. Moore, Jour. Linn. Soc. Bot. 35: 310. 1902.
Vernonia marginata Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 278. 1877.

Zomba District: Zomba Plateau, locally common in *Brachystegia* woodlands, herb 1–1.5 m. high, with erect single stem rather freely branched, leaves grey beneath, flowers purple, 1500 m., June 5, 1946, *16258*. Cholo District: Cholo Mountain, occasional in rain-forest regrowth, herb 1 m. high, leaves grey beneath, flowers purple, 1200 m., Sept. 21, 1946, *17702*. East Africa from Uganda to Nyasaland.

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[33] Determinations by B. L. Burtt, formerly at the Royal Botanic Gardens, Kew.

[34] *Crassocephalum* by E. Milne-Redhead, Royal Botanic Gardens, Kew.

Vernonia holstii O. Hoffm. Bot. Jahrb. **20**: 220. 1894.

Mlanje District: Likubula Gorge, frequent on rocky banks of river, shrub 1.5–2 m. high, weak, open branching habit, flowers very pale pink, 840 m., June 20, 1946, *16382*. Kenya, Tanganyika Territory, Nyasaland, and S. Rhodesia.

Capitula a little smaller than usual; possibly varietally distinct, but not more.

Vernonia bainesii Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 272. 1877.

Kota-kota District: Nchisi Mountain, common among rocks in *Brachystegia* woodland, two plants found in flower, perennial herb 80–100 cm. high, several stems erect from a stout taproot, flowers lavender, 1500 m., July 26, 1946, *16961*. S. Rhodesia, and now new to Nyasaland.

Brass 16961 is a form with the phyllaries more acute than in other specimens I have seen.

Vernonia petersii Oliv. & Hiern ex Oliv. Trans. Linn. Soc. **29**: 90. 1873.

Zomba District: Zomba Plateau, on rocky open slopes, herb 40–50 cm. high, flowers purple, 1500 m., June 2, 1946, *16146*; ibid., frequent in *Brachystegia* woodlands, perennial herb 40–70 cm. high, flowers purple, 1500 m., June 6, 1946, *16274*. Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 20 cm. high, leaves purplish, flowers purple, 1100 m., June 17, 1946, *16339*. Portuguese East Africa, Nyasaland, N. and S. Rhodesia, Angola.

I do not see that *V. karongensis* Bak. Kew Bull. **1898**: 147 (1898) differs specifically from *V. petersii*, and the latter is here taken in a wide sense.

Vernonia poskeana Vatke & Hildebr. Oesterr. Bot. Zeitschr. **1875**: 324. 1875.

Zomba District: Zomba Plateau, common in *Brachystegia* woodlands especially on roadsides, annual herb 30–80 cm. high, flowers rich dark purple, showy, 1430 m., May 30, 1946, *16090*. Kota-kota District: Nchisi, sporadic in *Brachystegia* woodland, herb 80–100 cm. high, flowers dark purple, 1350 m., Aug. 1, 1946, *17087*. Tanganyika Territory, southward to the Transvaal.

Vernonia chloropappa Bak. Kew Bull. **1898**: 146. 1898.

North Nyasa District: Nyika Plateau, Nchena-chena Spur, occasional in *Brachystegia* woodlands, 70–80 cm. high, flowers pink, pappus of fruit green, 1400 m., Aug. 20, 1946, *17368*. Nyasaland, N. Rhodesia.

Vernonia nestor S. Moore, Jour. Linn. Soc. Bot. **35**: 317. 1902.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, perennial herb 50–70 cm. high, flowers dark purple, pappus of fruit white, 1400 m., July 24, 1946, *16894*. From Tanganyika Territory to N. Rhodesia and Nyasaland in the east, extending westward to Nigeria.

Vernonia natalensis Schultz-Bip. ex Walp. Repert. **2**: 947. 1843.

Mlanje District: Mlanje Mountain; Chambe Plateau, pathways in grasslands, herb 40 cm. high, flowers purple, 1950 m., July 9, 1946, *16764*. Tanganyika Territory to South Africa.

Vernonia cistifolia O. Hoffm. in Engl. Pflanzenw. Ost-Afr. **C**: 404. 1895.

Zomba District: Zomba Plateau, in open grasslands, 3 plants seen, perennial herb 60–90 cm. high, erect from a thick woody stock, stoloniferous, leaves grey beneath, flowers purple, 1320 m., May 31, 1946, *16122*. Tanganyika Territory to S. Rhodesia and Portuguese East Africa.

Brass 16122 is, as usual, the var. **rosea** O. Hoffm., l.c., with purple flowers. *V. bothrioclinoides* C. H. Wright, Kew Bull. **1906**: 108 (1906), which was originally described from Nyasaland, was said by Wright to be akin to *V. karaguensis* Oliv. & Hiern ex Oliv.; to me that seems wrong. *V. bothrioclinoides* is in my opinion merely a variant of *V. cistifolia* with phyllaries more strongly reflexed than normal; and other plants that can only be put under *V. cistifolia* occur with the phyllaries partially reflexed. In its extreme it is striking, and I consider the following transfer necessary: *V. cistifolia* O. Hoffm. var. *bothrioclinoides* (C. H. Wright) Brenan, stat. nov.

Vernonia bellinghamii S. Moore, Jour. Bot. **38**: 155. 1900.

Mombera District: 10 miles N. of Mzimba, common on stony ground in *Brachystegia* woodland, shrub 2–2.5 m. tall, leaves grey beneath, pappus of fruit white, 1370 m., Aug. 9, 1946, *17144*. Portuguese East Africa, Nyasaland, and S. Rhodesia.

Vernonia melleri Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 282. 1877.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, perennial herb 25–50 cm. high, flowers pale blue, 1100 m., June 17, 1946, *16333*.* Mlanje District: Likubula Gorge, occasional in *Uapaca-Brachystegia* woodlands, herb 50–70 cm. high, with one or more stems erect from a stout woody stock, flowers pale blue, 840 m., June 20, 1946, *16379*. Kota-kota District: Nchisi, rare, in *Brachystegia* woodland, perennial herb 80–120 cm. high, stem one, erect from a thick woody stock, flowers cornflower-blue, showy, 1350 m., Aug. 1, 1946, *17088*. Portuguese East Africa, Nyasaland, N. and S. Rhodesia, Belgian Congo.

Vernonia paludigena S. Moore, Jour. Bot. *52*: 91. 1914.

Kota-kota District: Chia area, one example in dry sandy woodland of lake plain, herb, flowers pale greenish-blue, 480 m., Sept. 6, 1946, *17548*.* Belgian Congo and Nyasaland, probably also in N. Rhodesia and Tanganyika Territory.

Vernonia pteropoda Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 283. 1877.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in forest opening, shrub 2–2.5 m. high, little branched, just beginning to open flowers, flowers white, 1850 m., July 8, 1946, *16731*.* Cholo District: Cholo Mountain, occasional in rain-forest undergrowth, herb up to 1 m. high, flowers white, 1300 m., Sept. 20, 1946, *17679*. Portuguese East Africa, Nyasaland, S. Rhodesia.

Vernonia amygdalina Del. Cent. Pl. Afr. Voy. Méroé 41. 1826.

Kota-kota District: Nchisi, common in old fallow lands and on roadsides, tree 4–5 m. high, compact, attractive, flowers white, pappus of fruit yellowish, native name (Chinyanja) fusa, 1350 m., Aug. 1, 1946, *17080*. Kasungu District: Kasungu, on brushy banks of stream in *Brachystegia* woodland, shrub 5 m. high, flowers white, 1000 m., Aug. 24, 1946, *17407*. Chikwawa District: Lower Mwanza River, on sandy river-banks, shrub 2 m. high, flowers white, 180 m., Oct. 3, 1946, *17930*. Widespread in tropical Africa.

Vernonia glabra (Steetz) Vatke, Oesterr. Bot. Zeitschr. **27**: 194. 1877.

Linzia glabra Steetz in Peters, Reise Mossamb. Bot. 353. 1863.

Zomba District: Zomba, frequent in long grass of woodlands, herbaceous shrub 1.5–2 m. high, very showy, florets bright pale blue, pappus of fruit purplish, 1150 m., May 26, 1946, *16037*. Kota-kota District: Nchisi, occasional weed in old gardens, herb about 1 m. tall, stem simple, erect, florets purple in bud, pale blue at anthesis, 1100 m., Aug. 3, 1946, *17118*. Kenya to South Africa.

Vernonia obconica Oliv. & Hiern in Oliv, Fl. Trop. Afr. 3: 286 (1877) does not seem to me to be separable specifically from *V. glabra*.

Vernonia glabra (Steetz) Vatke var. **laxa** (Steetz) Brenan, comb. nov.

Linzia glabra Steetz var. *laxa* Steetz in Peters, Reise Mossamb. Bot. 354. 1863.
? *Vernonia ondongensis* Klatt ex Schinz, Bull. Herb. Boiss. 3: 430. 1895.

Chikwawa District: Chikwawa, occasional on grassy alluvial plain, woody herb to 2 m. high, flowers purple, 200 m., Oct. 2, 1946, *17898*. Lower Mwanza

River, scattered on sandy beaches, herb 1 m. high, flowers purple, 180 m., Oct. 6, 1946, *18018*. For distribution see below.

I have not seen the original specimens of *Linzia glabra* var. *laxa*, which are presumably now destroyed, but Steetz's description leaves no reasonable doubt that he intended our plant. Although some intermediates do occur, var. *laxa* seems generally quite a well-marked variety, with smaller narrower capitula often on longer peduncles and a usually lax inflorescence. In the Kew Herbarium there are numerous specimens of the variety—too numerous to cite in detail here—ranging from Tanganyika Territory in the north to Zululand in the south. Judging from collectors' notes, var. *laxa* seems decidedly addicted, as Steetz originally pointed out, to cultivated fields, and sandy and marshy ground by rivers and lakes.

Vernonia aurantiaca (O. Hoffm.) N. E. Br. Kew Bull. **1909**: 116. 1909.

Gongrothamnus divaricatus Steetz in Peters, Reise Mossamb. Bot. 342. 1863; non *Vernonia divaricata* Sw. 1806.
Gongrothamnus aurantiacus O. Hoffm. Bot. Jahrb. **30**: 433. 1901.
Vernonia vitellina N. E. Br. Kew Bull. **1909**: 117. 1909.

Mombera District: 30 miles S. of Njakwa, common on termite mounds in *Brachystegia* woodland, shrub 3-5 m. high, subscandent, flowers orange, showy, 1220 m., Aug. 9, 1946, *17141*. Chikwawa District: Chikwawa, in dry brushy forest of river-plain, subscandent shrub 3 m. high, flowers orange, 200 m., Oct. 2, 1946, *17903*.* Kenya to Bechuanaland.

Vernonia aurantiaca represents the form with shortly peduncled capitula and ovate to oblong acute phyllaries; while *V. vitellina* has heads on longer peduncles and lanceolate very acute phyllaries. I find so many gradations between these extremes that I do not consider that they can be kept as distinct species.

Vernonia shirensis Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 291, 1877.

Vernonia leptolepis Bak. Kew Bull. **1898**: 147. 1898; non O. Hoffm. in Engl. Pflanzenw. Ost-Afr. C: 405. 1895.

Zomba District: Zomba, frequent on slopes of hills in *Brachystegia* woodland, shrub 1 m. high, flower-bracts green, upper white, florets white, 1100 m., May 26, 1946, *16027*.* Kota-kota District: Nchisi Mountain, occasional in shrubberies bordering rain-forest, shrub 1.5 m. high, robust, leaves greyish beneath, upper bracts white, lower green, flowers very pale pink, 1600 m., July 31, 1946, *17059*. Cholo District: Cholo Mountain, occasional in rain-forest regrowth, shrub 1.5 m. high, upper bracts white, lower green, florets white, 1200 m., Sept. 21, 1946, *17701*. Belgian Congo, Nyasaland, N. and S. Rhodesia.

I do not think that *V. leptolepis* is more than a glabrescent form of *V. shirensis* Oliv. & Hiern, and prefer to treat the two as conspecific.

Vernonia sp. nr. **tolypophora** Mattf. Bot. Jahrb. 59 (Beibl. 133): 6. 1924.

North Nyasa District: Nyika Plateau, one specimen seen on forest edges, shrub 1.5 m. high, erect, sparsely branched, flowers purple, later white, 2300 m., Aug. 11, 1946, *17174*.

Brass 17174 has broader appendages to the phyllaries than in *V. tolypophora*, which was described from southwestern Tanganyika Territory. A specimen without number in Herb. Kew. collected by Whyte in N. Nyasaland is apparently the same as Mr. Brass' specimen, but further material is wanted.

Vernonia polyura O. Hoffm. Bot. Jahrb. 30: 422. 1901.

Mlanje District: Likubula Gorge, frequent in *Brachystegia* woodlands, tree 4-6 m. high, leaves crinkled, very pale dull green, bitter, used in native medicine, flowers purple, 840 m., June 20, 1946, *16374*. Kasungu District: Kasungu; Kasungu Hill, frequent on rocky slopes, tree or shrub 4-7 m. high, flowers dry, apparently white, 1100 m., Aug. 28, 1946, *17452*. Tanganyika Territory and Nyasaland.

Vernonia thomsoniana Oliv. & Hiern ex Oliv. Trans. Linn. Soc. 29: 91 (1873) var. **livingstoniana** (Oliv. & Hiern) Pichi-Sermolli, Webbia **7**: 340. 1950.

Vernonia livingstoniana Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 295. 1877.

Kota-kota District: Nchisi, occasional in gullies in *Brachystegia* woodland, shrub 2–2.5 m. high, stems several, erect, leaves somewhat bitter, in repute as a febrifuge, flowers pale purple, native name (Chinyanja) fusa, 1350 m., Aug. 1, 1946, *17077*. Nchisi Mountain, common on old garden land, about 2 m. high, flowers pale purple, 1350 m., Sept. 9, 1946, *17612*. Cholo District: Cholo Mountain, on grassy edge of rain-forest, erect shrub, sparingly branched, flowers white, 1200 m., Sept. 22, 1946, *17734*. Anglo-Egyptian Sudan to S. Rhodesia and Portuguese East Africa.

I agree with Prof. Dr. Pichi-Sermolli that the differences between *Vernonia livingstoniana* and *V. thomsoniana* are not specific, and I therefore unite them.

Vernonia ampla O. Hoffm. Bot. Jahrb. **30**: 423. 1901, e descr.

Vernonia podocoma sensu Schultz-Bip. ex Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 296. 1877; non Schultz-Bip. ex Vatke, Linnaea **39**: 476. 1875. Vide Pichi-Sermolli, Webbia **7**: 342–345. 1950.

Vernonia oliveriana Pichi-Sermolli, Webbia **7**: 345. 1950.

Cholo District: Cholo Mountain, abundant in rain-forest regrowths, shrub 2–4 m. high, flowers purple, conspicuous, native name (Chinyanja) fusa, 1200 m., Sept. 25, 1946, *17805*. Abyssinia to the Transvaal and Zululand.

I am inclined to agree with Prof. Dr. Pichi-Sermolli that *Vernonia podocoma* Schultz-Bip. ex Oliv. & Hiern must be considered a later homonym. I do not, however, feel that it was necessary to create the new name *Vernonia oliveriana*, as there were already names in existence which in my opinion belong to the same species. The earliest of these is *Vernonia ampla*, which I therefore adopt. I have not seen the type, which is now presumably destroyed, but the description is so clear that I feel that there is no doubt about the plant intended.

Ageratinastrum polyphyllum (Bak.) Mattf. Notizbl. Bot. Gar. Berlin **11**: 412. 1932.

Ageratum polyphyllum Bak. Kew Bull. **1898**: 148. 1898.

North Nyasa District: Nyika Plateau, Nchena-chena Spur, plentiful in open grasslands, perennial herb 40–50 cm. high, flowers rose-purple, 2000 m., Aug. 20, 1946, *17345*. Tanganyika Territory and Nyasaland.

Elephantopus scaber L. Sp. Pl. 814 (1753) subsp. **plurisetus** (O. Hoffm.) Philipson, Jour. Bot. **76**: 303. 1938.

Elephantopus scaber L. var. *plurisetus* O. Hoffm. Bot. Jahrb. **30**: 426. 1901.

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, perennial herb 70 cm. high, flowers not seen, 1430 m., May 30, 1946, *16086*. The species in Old World tropics, the subspecies (including some varieties) in E. Africa from Uganda to Portuguese East Africa and Angola.

Adenostemma caffrum DC. Prodr. 5: 112 (1836)[35] var. **asperum** Brenan, var. nov.

Caules plus minusve pubescentes necnon praesertim inferne pilis conicis rigidis plus minusve densis asperi; folia lanceolata vel ovato-lanceolata, brevius et obtusius serrata, utrinque aspera vel asperrima.

Kota-kota District: Nchisi Mountain, marshy ground in *Brachystegia* woodland, herb, stem reddish, flowers white, 1400 m., July 27, 1946, *16979* (typus varietatis); ibid., in marshy *Brachystegia* woodland, herb 1 m. high, flowers white, 1400 m., July 28, 1946, *17009*.* The species widespread in tropical and S. Africa; for the variety see below.

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[35] *Adenostemma viscosum* sensu Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 299. 1877, pro parte; non Forst.

Besides the above Nyasaland specimens, the following in Herb. Kew. are referable to this variety.

BELGIAN CONGO: Rutshuru, 1937, *Ghesquière 3790.*

ANGLO-EGYPTIAN SUDAN: Tuhumis Seriba, Tudimma, Niam-niam Land, in swamps, flowers white, May 25, 1870, *Schweinfurth 3784.*

UGANDA: Western Province, Toro District: "Kasamaga" (? = Kasagama), 1620 m., April, *Scott Elliot 7606.* Buganda Province, Masaka District: Kiebbe, occasional in swampy grassland, 1 m. high, flowers white, 1220 m., June 25, 1935, *A. S. Thomas Th. 1326.* Mengo District: swampy parts near Kampala, June 24, 1915, *J. D. Maitland 137. AB*; King's Lake, Kampala, on marshy outskirts of lake, height up to nearly 75 cm. in some cases, stems and leaves purplish, flowers white, 1190 m., Nov. 22, 1935, *Chandler-Hancock 88.* Entebbe District: Entebbe, Butambala country, herb 1 m. high, heads white owing to large long white stigmas protruding, all parts of flower with sticky glands, sweet-scented, 1220 m., Dec. 1930, *Hansford S 1867.* Province and district doubtful: Nyakaswia School, among shrubs, flowers white, leaves used for cough-medicine, vernacular name omurubate, 1620 m., May 20, 1932, *E. M. Shillito 112.* "Cultivated ground Uganda," herb 30–60 cm. high, whole plant rough to touch, flowers white, 1880, *Rev. C. T. Wilson 128.*

Kenya: Nyanza Valley Province, Nandi District: Nandi country, Sibu, 1905, *Sir Evan James s. n.*

S. RHODESIA: Umtali District: Odzani River Valley, 1914, *A. J. Teague 177.*

Typical *Adenostemma caffrum* DC. from S. Africa has coarsely incise-serrate leaves, usually with a very short scabrid pubescence on the nerves beneath, and a similar indumentum on the stem. The new variety has a much coarser and denser, strongly asperous pubescence on both sides of the leaf, giving it a sand-papery "feel." The stem, especially the lower part, is more or less strongly beset with, in addition to its pubescence, hard conical tubercle-like hairs making the stem very rough. The leaves of the new variety are lanceolate to ovate-lanceolate with shallower and more obtuse serrations than in the S. African plant. In tropical Africa plants occur having leaves similar in shape to var. *asperum*, but glabrous or only sparingly pubescent, and these are connected with the variety by some intermediates.

Adenostemma perrottetii DC. Prodr. 5: 110. 1836.

Adenostemma dregei DC. Prodr. 5: 111. 1836.

Adenostemma viscosum sensu Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 299. 1877, pro parte; non Forst.

Cholo District: Cholo Mountain, gregarious in open muddy bottoms of gullies in rain-forest, herb about 50 cm. high, fleshy, ascending, flowers white, 1200 m., Sept. 21, 1946, *17724.* Widespread in tropical and S. Africa.

I am unable to distinguish *A. dregei* from *A. perrottetii*, which is itself very closely akin to the Asiatic *A. lavenia* (L.) Kuntze, and apparently only distinguishable, perhaps not specifically, by the nature of the warting on the achenes. For further comments see Koster, Blumea 1: 469 et seq. (1935).

Eupatorium africanum Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 301. 1877.

Kota-kota District: Chenga Hill, frequent in low open *Brachystegia* woodland, perennial herb 30–40 cm. high, viscid, rootstock large, woody, numerous young stems forming bushy clumps after burning of the grass, flowers cream, 1600 m., Sept. 9, 1946, *17596.* Widespread in tropical Africa, extending south to the Transvaal and Swaziland.

Mikania cordata (Burm. f.) B. L. Robins. Contr. Gray Herb. 104: 65. 1934.

Eupatorium cordatum Burm. f. Fl. Ind. 176. *pl. 58, f. 2.* 1768.

Mikania scandens sensu auct. afr.; non (L.) Willd.

Mlanje District: Mlanje Mountain, west slopes, in brushy second-growth forest, vine 3 m. high, flowers cream, 1650 m., July 18, 1946, *16875*. Kota-kota District: Nchisi Mountain, occasional in rain-forest of gullies, vine 3–5 m. tall, flowers white, anthers brown, 1350 m., Aug. 2, 1946, *17105*. Cholo District: Cholo Mountain, common in rain-forest regrowths, vine 4–8 m. high, flowers white, 1200 m., Sept. 23, 1946, *17766*. Tropics of the Old World.

Robinson (l.c.) points out that the old-world plant that we have been calling *M. scandens* is not the same thing as Willdenow's true *M. scandens* from N. America, but that it should bear the name *M. cordata*. Although, owing to lack of material, Robinson left the exact clearing-up of the African "*M. scandens*" till later, the common plant of Africa seems obviously the same as that of Asia and also, as Robinson says, different from the North American *M. scandens*. For additional comments see Koster, Blumea **1**: 509–510 (1935).

Dichrocephala integrifolia (L.f.) Kuntze, Rev. Gen. Pl. 333. 1891.

Hippia integrifolia L. f. Suppl. 389. 1781.
Grangea latifolia Lam. Ill. *pl.* 699, *f.* 1. 1797.
Dichrocephala latifolia (Lam.) DC. Prodr. **5**: 372. 1836; Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 303. 1877.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in a forest opening, herb 80 cm. high, flowers greenish, 1890 m., July 12, 1946, *16801*.* Tropics and subtropics of the Old World.

Felicia homochroma S. Moore, Jour. Bot. 59: 229. 1921.[36]

Kota-kota District: Nchisi Mountain, plentiful on shallow seepage-wet soil in *Brachystegia* woodland, herb 10–30 cm. high, flowers yellow, 1400 m., July 24, 1946, *16915*. Belgian Congo, N. Rhodesia, and Nyasaland.

Microglossa pyrifolia (Lam.) Kuntze, Rev. Gen. Pl. 353. 1891.

Conyza pyrifolia Lam. Encyc. **2**: 89. 1786.
Microglossa volubilis DC. Prodr. **5**: 320. 1836; Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 309. 1877.

Cholo District: Cholo Mountain, in rain-forest regrowth, scandent shrub 10 m. high, leaves greyish beneath, flowers greenish-white, 1200 m., Sept. 28, 1946, *17852*. Widespread in tropical Africa and Asia.

Nidorella malosana Bak. Kew Bull. **1898**: 149. 1898.

Zomba District: Zomba Plateau, in *Brachystegia* woodlands, perennial herb 40 cm. high, flowers yellow, 1500 m., June 6, 1946, *16287*. Endemic to Nyasaland.

Nidorella auriculata DC. Prodr. **5**: 322. 1836.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in an erosion gully in grassland, shrub 1.5 m. high, flowers yellow, 1900 m., July 16, 1946, *16854*. Nyasaland to South Africa.

Nidorella microcephala Steetz in Peters, Reise Mossamb. Bot. 406. 1863; Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 310. 1877.

Kota-kota District: Chia area, plentiful on moist banks of a stream in lake-plain woodland, herb about 1 m. high, flowers yellow, 480 m., Sept. 2, 1946, *17504*. Chikwawa District: Lower Mwanza River, plentiful on sandy beaches, herb about 1 m. high, flowers yellow, 180 m., Oct. 4, 1946, *17971*. Uganda to Nyasaland and Portuguese East Africa.

Conyza persicifolia (Benth.) Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 312. 1877.

Erigeron persicaefolium Benth. in Hook. Niger Fl. 430. 1849.

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[36] Determined by R. D. Meikle.

Kota-kota District: Nchisi Mountain, only one example on edge of rain-forest, herb 2 m. high, flowers yellow, apparently an annual, 1650 m., July 31, 1946, *17053*. Widely distributed in tropical Africa.

Blumea aurita (L. f.) DC. ex Wight, Contr. Bot. India 16. 1834; DC. Prodr. 5: 449. 1836.

Conyza aurita L. f. Suppl. 367. 1781.

One piece mixed with *17932* [*Epaltes alata* (Sond.) Steetz var. *serratifolia* (Steetz) Meikle & Brenan, q. v.] from Chikwawa District, Lower Mwanza River, collected on Oct. 3, 1946. Tropics of the Old World.

Blumea lacera (Burm. f) DC. ex Wight, Contr. Bot. India 14. 1834; DC. Prodr. 5: 436. 1836.

Conyza lacera Burm. f. Fl. Ind. 180. 1768.

Kota-kota District: Kota-kota, in old gardens, herb 1.2 m. high, flowers purple, 460 m., Aug. 7, 1946, *Shortridge 17395*. Tropical Africa and Asia; also in S. America (? introduced).

Laggera alata (D. Don) Schultz-Bip. ex Oliv. Trans. Linn. Soc. 29: 94. 1873.

Erigeron alatum D. Don, Prodr. Fl. Nepal. 171. 1825.

Conyza alata Roxb. Hort. Beng. 61. 1814, nomen nudum; Fl. Ind. ed. 2. 3: 430. 1832, cum descr.

Kota-kota District: Nchisi Mountain, common in *Brachystegia* woodland, perennial herb 50-80 cm. high, aromatic, viscid, flower-heads nodding, flowers purple, 1400 m., July 24, 1946, *16892*; ibid., fruiting specimen of *16892*, in *Brachystegia* woodland, 1400 m., July 25, 1946, *16924*.* Widespread in tropical Africa and Asia, and decidedly variable.

Laggera brevipes Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 327. 1877.

Kota-kota District: Nchisi Mountain, in *Brachystegia* woodland, perennial herb 50 cm. high, leaves viscid, aromatic, flowers purple, heads erect, 1400 m., July 24, 1946, *16893*. Kenya to Angola and S. Rhodesia.

Epaltes alata (Sond.) Steetz[37] **var. serratifolia** (Steetz) Meikle & Brenan, comb. nov.

Epaltes umbelliformis Steetz var. *serratifolia* Steetz in Peters, Reise Mossamb. Bot. 454. 1863.

Chikwawa District: Lower Mwanza River, common on sandy beaches, aromatic herb to 1 m. high, stoloniferous, viscid, flowers purple, native name ligira, 180 m., Oct. 3, 1946, *17932*. *E. alata* and its variety have a wide distribution in E. Africa from the Anglo-Egyptian Sudan to the Cape, and also occur in the French Sudan and Chari.

This variety has been frequently misidentified in herbaria as *E. umbelliformis* Steetz, but a comparison between Steetz' descriptions of his f. *vulgaris* and var. *serratifolia* will show that typical *E. umbelliformis* is so close to *E. alata* as to not to be worth separating, even as a variety. For the main distinguishing characters of var. *serratifolia* reference may be made to Steetz' description; though none appear really constant, specimens may conveniently be sorted into those showing marked tendencies towards one or the other.

Brass 17932 was at any rate partly mixed: see *Blumea aurita* (L. f.) DC. ex Wight.

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[37] *Epaltes alata* (Sond.) Steetz in Peters, Reise Mossamb. Bot. 452. 1863; *Ethulia alata* Sond. Linnaea 23: 60. 1850; *Epaltes umbelliformis* Steetz incl. f. *vulgaris* Steetz in Peters, Reise Mossamb. Bot. 452, 453. 1863.

Helichrysum odoratissimum (L.) Less. Syn. Gen. Comp. 301. 1832; Moeser, Bot. Jahrb. 44: 242. 1910.

Gnaphalium odoratissimum L. Sp. Pl. 855. 1753.
Achyrocline hochstetteri Schultz-Bip. ex A. Rich. Tent. Fl. Abyss. 1: 429. 1848.
Helichrysum hochstetteri (Schultz-Bip. ex A. Rich.) Hook. f. Jour. Linn. Soc. Bot. 6: 13. 1862; Moeser, Bot. Jahrb. 44: 241. 1910.

Zomba District: Zomba Plateau, common in moist grassy clearings, herb 1 m. high, leaves greyish, flowers bright golden-yellow, 1400 m., May 28, 1946, *16071*. Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent in grassland edging forest, herb 40–50 cm. high with numerous suberect branches forming a shapely grey bush, flowers yellow, 2180 m., July 3, 1946, *16638*; ibid., plentiful on forest edges of secondary growths, herb, scrambling to 2–3 m., flowers bright yellow, inflorescence flat-topped, 1890 m., July 13, 1946, *16824*. Kota-kota District: Nchisi Mountain, common on grassy borders of forest, herb 1 m. high, erect or ascending, sparsely branched or simple, flowers yellow, 1400 m., July 27, 1946, *16984*. Abyssinia and Anglo-Egyptian Sudan to South Africa.

I am quite unable to see specific differences between *H. odoratissimum* and *H. hochstetteri*. The individual capitula are slightly larger and more-flowered in south tropical Africa and the Cape, and correspondingly smaller and fewer-flowered in the northern part of the range, but there seems a gradual transition from one to the other in the intermediate part.

Helichrysum chrysophorum S. Moore, Jour. Linn. Soc. Bot. 37: 318. 1906; Moeser, Bot. Jahrb. 44: 242. 1910.

Mlanje District: Mlanje Mountain, southwest ridge, frequent on sloping rock-faces, herb 30–40 cm. high, pleasantly aromatic, viscid, flowers yellow, 2350 m., June 28, 1946, *16504*. Endemic to Nyasaland.

Helichrysum schimperi (Schultz-Bip. ex A. Rich.) Moeser, Bot. Jahrb. 44: 244. 1910.

Achyrocline schimperi Schultz-Bip. ex A. Rich. Tent. Fl. Abyss. 1: 428. 1848.

North Nyasa District: Nyika Plateau, on edges of juniper forest, scrambling shrub 4–5 m. tall, leaves grey beneath, flowers yellow, bracts greenish, 2200 m., Aug. 11, 1946, *17151*. Abyssinia and Anglo-Egyptian Sudan to Nyasaland.

Helichrysum densiflorum Oliv. Hook. Ic. Pl. *pl. 2286*. 1894; Moeser, Bot. Jahrb. 44: 247. 1910.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent in rocky places on grasslands, tree or shrub up to 3 m. high, branches erect, leaves viscid, inflorescence flat-topped, flowers yellow, 2200 m., July 3, 1946, *16644*. Nyasaland and Tanganyika Territory.

Helichrysum fruticosum (Forsk.) Vatke, Linnaea 39: 491. 1875; Moeser, Bot. Jahrb. 44: 257. 1910.

Gnaphalium fruticosum Forsk. Fl. Aegypt.-Arab. 218. 1775.

North Nyasa District: Nyika Plateau, common in open grasslands, herb 25–50 cm. high, annual, flowers yellow, 2340 m., Aug. 12, 1946, *17185*. Abyssinia and Anglo-Egyptian Sudan to South Africa; also in the Cameroons and the Comoro Islands.

H. fruticosum is uncommonly variable, and is here taken in a wide sense.

Helichrysum abietinum O. Hoffm. Bot. Jahrb. 30: 429. 1901; Moeser, Bot. Jahrb. 44: 278. 1910.

North Nyasa District: Nyika Plateau, occasional in montane forest secondary growths, shrub about 1 m. high, compact, bushy, early flowers only, yellow, 2400 m., Aug. 18, 1946, *17320*. New to Nyasaland, previously only known from Tanganyika Territory.

The specimen has rather longer leaves (ca. 1.1–1.5 cm.) than the Tanganyika material of *H. abietinum*, but I see no other difference, and would regard it merely as an habitat form.

Helichrysum lastii Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:) 430. 1892; Moeser, Bot. Jahrb. **44**: 279. 1910.

Zomba District: Zomba Plateau, occasional on an exposed rocky summit, perennial herb 30–40 cm. high, plant grey-tomentose, flowers bright yellow, 1820 m., May 31, 1946, *16127*. Mlanje District: Mlanje Mountain; Luchenya Plateau, common and conspicuous in grasslands, often gregarious, perennial herb 30–50 cm. high, leaves silvery-grey, flowers yellow, 1820 m., June 25, 1946, *16424*. Nyasaland and Portuguese East Africa; a very similar plant collected at Nakuru in Kenya *(Scott Elliot 6843)*.

Helichrysum (§ Leptolepidea) riparium Brenan, sp. nov.

H. pachyrhizo Harv. tantum comparanda, capitulis haudquaquam rubellis, involucri foliolis superne abrupte squarroso-reflexis parte reflexo undulato-crispato, internodiis et foliis superne longioribus satis differt.

Herba 30–40 cm. alta, erecta, basi et superne valde ramosa ramis erecto-patentibus, praeter inflorescentias omnino dense sed breviuscule griseo-araneosa; caules 1–3 mm. diametro; internodia superne circiter 1–2 cm. longa. *Folia* chartacea, laxa, recurva usque suberecta, lineari-oblanceolata, inferiora 3–3.8 cm. longa et apicem versus 2.5–5 mm. lata, superne sensim decrescentia et plerumque 0.8–2 cm. longa et 1–2 mm. lata, omnia basi caulem arcte et anguste amplectentia, apice subacuta; costa et nervi vix cernendi. *Inflorescentia* valde laxa, e glomerulis numerosis subsessilibus vel usque ad circiter 3 cm. longe pedunculatis subglobosis densissimis circiter 1–1.8 cm. diametro e capitulis compluribus efformatis basi foliis paucis amplexis composita. *Capitula* in glomerulis sessilia, ut videtur homogama, circiter 24–25-flora; involucrum 5 mm. altum, apicem versus 6 mm. latum; foliola praeter extima glabra, scariosa, nitidula, albido-hyalina, circiter 6-serialia, superne squarroso-recurva et margine undulata, apice acuta vel apiculata, extima oblonga 2 mm. longa 0.5 mm. lata, interiora majora usque ad 4.25 mm. longa 1 mm. lata parte inferiore viridulo-costata et hyalina superiore albida. *Flores* ⚥ anguste tubulosi, 3.5–3.7 mm. longi, ad apicem minute 5-lobati, tubo pallido apice purpurascenti, lobis luteis; antherae 1.4 mm. longae. *Ovarium* dense papilloso-glandulosum, pappi setis 3 mm. longis coronatum. *Achaenia* obovoidea, 0.7 mm. longa, 0.3 mm. lata, purpureo-brunnea, glandulosa.

NYASALAND: Chikwawa District: Lower Mwanza River, one specimen on a sandy beach, herb, flowers yellow, bracts white, Oct. 3, 1946, *17938**; ibid., occasional on sandy beaches, herb 40 cm. high, greyish, bushy, flowers yellow, bracts white, 180 m., Oct. 4, 1946, *17974* (TYPUS).

ANGOLA: Mossamedes District: Between Umpupe and Palmfontein, 1000 m., Aug. 27, 1899, *Baum 28* (Herb. Brit. Mus.).

H. riparium has a distinct superficial similarity to *H. pachyrhizum* Harv., but is distinguished by habit and capitula. In addition the longer internodes and upper leaves give *H. riparium* a laxer appearance than is normal in *H. pachyrhizum*. In the latter the capitula are always, it seems, more or less tinted with rosy or purple, a colour which is absent in the new species except for a slight tinge on the corolla-tube. The phyllaries of *H. riparium* have a squarrose appearance even when young, while in *H. pachyrhizum* they are at first erect (although becoming reflexed later on), and always lack the pretty and characteristic crisping of the upper part that *H. riparium* shows. The inner phyllaries of the latter seem to have a more pronouncedly apiculate apex than those of *H. pachyrhizum*.

Baum 28 in the herbarium of the British Museum (Natural History) is a form of *H. riparium* with the stem rather quickly glabrescent and brownish, and the leaves less tomentose. The specimen was enumerated by O. Hoffmann in Warburg, Kunene-Sambesi Exp. 412 (1903) as *H. pachyrhizum* Harv., and the locality as "vor Ediva" at 930 m. The cited locality is that on the label of the British Museum specimen.

Helichrysum panduratum O. Hoffm. Bull. Herb. Boiss. II. 1: 827. 1901; Moeser, Bot. Jahrb. 44: 312. 1910.

Cholo District: Cholo Mountain, frequent in rain-forest regrowths, herb 1 m. high, loosely branched, branches ascending, flowers yellow, 1200 m., Sept. 19, 1946, *17654*. Uganda to South Africa.

Helichrysum bullulatum S. Moore, Jour. Linn. Soc. Bot. 37: 319. 1906; Moeser, Bot. Jahrb. 44: 313. 1910.

Mlanje District: Mlanje Mountain; Luchenya Plateau, uncommon among rocks in grassland, shrub 1 m. high, branches erect, numerous, flowers brownish-yellow, 2200 m., July 3, 1946, *16639*. Endemic to Nyasaland.

Helichrysum syncephalum Bak. Kew Bull. 1898: 151. 1898; Moeser, Bot. Jahrb. 44: 314. 1910, excl. syn. et spec. in monte Mlanje lectum.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on grassy edges of forest, herb about 1 m. high, just coming into flower, flower-bracts white (pink in bud), 1890 m., July 8, 1946, *16736*; ibid., common on forest edges and in low second growths, herb 1.5–2 m. high, flowers yellow, bracts pink in bud, pinkish-white in anthesis, 1890 m., July 14, 1946, *16832*. Endemic to Nyasaland.

See note under the following species.

Helichrysum sordidum S. Moore, Jour. Linn. Soc. Bot. 37: 315. 1906.

Helichrysum achyroclinoides S. Moore, Jour. Linn. Soc. Bot. 35: 332. 1902; non Bak. Jour. Linn. Soc. Bot. 25: 328. 1890.

Helichrysum syncephalum sensu Moeser, Bot. Jahrb. 44: 314. 1910, quoad syn. et spec. in monte Mlanje lectum; non Bak.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional on rocks in open grasslands, herb 30–50 cm. high, forming a compact grey bush, flowers dull white, 1870 m., June 27, 1946, *16458*; ibid., frequent in rocky grasslands, herb 30–40 cm. high, habit bushy, flowers yellow, bracts dull white, 1960 m., July 16, 1946, *16851*. Endemic to Nyasaland.

H. sordidum differs from *H. syncephalum* Baker in the very branched bushy habit, with numerous and more slender stems, much smaller and more closely set leaves, smaller, more compact and scarcely pink-tinged corymbs. Moeser (l.c.) sinks *H. sordidum* under *H. syncephalum*, but I disagree with this opinion. Both species have been re-collected since, and there is no sign of intermediates.

Helichrysum adscendens (Thunb.) Less. Syn. Gen. Comp. 274. 1832; Moeser, Bot. Jahrb. 44: 319. 1910.

Gnaphalium adscendens Thunb. Prodr. Fl. Cap. 150. 1800.

Zomba District: Zomba Plateau, frequent in open grasslands, perennial herb 50–80 cm. high, with several to many stems erect from a basal rosette, plant greyish, florets and bracts pale yellow, 1800 m., May 31, 1946, *16121*. New to Nyasaland; extending through S. Rhodesia to South Africa.

Helichrysum whyteanum Britten, Trans. Linn. Soc. II. Bot. 4: 19. 1894; Moeser, Bot. Jahrb. 44: 327. 1910.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent in open rocky situations on grasslands, shrub 30–40 cm. high, of compact bushy habit, a very beautiful species, flower-bracts silvery white flushed with pink (just coming into flower), 2150 m., July 11, 1946, *16790*. Endemic to Nyasaland.

Helichrysum patulifolium Bak. Kew Bull. **1898**: 150. 1898; Moeser, Bot. Jahrb. 44: 330. 1910.

North Nyasa District: Nyika Plateau, common on grassy edges of forest, shrub 60–80 cm. high, flowers yellow, 2300 m., Aug. 11, 1946, *17176*; ibid., local in grasslands, shrub 30–40 cm. high, flowers yellow, lower bracts reddish, upper yellow, 2400 m., Aug. 18, 1946, *17314*; ibid., Nchena-chena Spur, plentiful in open grassland, shrub 50–70 cm. high, flowers yellow, bracts yellow, sometimes tinged with red, 2000 m., Aug. 20, 1946, *17347*. Nyasaland, Tanganyika Territory, and the Belgian Congo.

Helichrysum (§ Polylepidea) milne-redheadii Brenan, sp. nov.

H. patulifolio Baker perspicue affinis, capitulis multo majoribus plerumque valde laxe subcorymbosis vel singulatim dispositis, foliolis involucri interioribus longioribus differt.

Herba perennis, erecta, usque ad 1 m. alta; caules e caudice incrassato ut videtur singulatim vel bini exorientes, 1–3 mm. diametro, primo araneosi necnon pilis nonnullis patentibus glandulosis inconspicue instructi, serius glabrescentes et brunnei, inferne denudati et cicatricibus foliorum delapsorum notati, superne plus minusve laxe ramosi et dense foliosi; internodia brevissima, circiter 1–2 mm. longa. *Folia* rigidula, patentia, saepe varie arcuata, subtus albido-araneosa sed hoc indumento marginibus revolutis saepe plus minusve occulto, supra pilis numerosis rigidis brevibus glandulosis asperula et primo parce et evanescenter araneosa, linearia, basi sessilia et saepe dilatato-auriculata, apice acuta, 6–18 mm. longa, medio 1–1.5 mm. lata, suprema parum reducta; costa supra canaliculato-impressa, subtus prominula, nervis aliis vix cernendis. *Inflorescentiae* laxae, oligo-(3–6-)cephalae, capitulis aliis solitariis ramos laterales terminantibus saepe adjunctis. *Capitula* heterogama; involucrum 1.1–1.4 cm. altum, circiter 1.3–1.5 cm. latum; foliola appressa, circiter 7-serialia, glabra vel parce araneosa, basi unguiculata; lamina foliolorum interiorum omnino lutea vel nonnunquam luteo-rubella, ovato-lanceolata, acuta, subintegra, 7–8 mm. longa, 2–2.5 mm. lata, sed intimorum reducta et circiter 1 mm. lata; ea medianorum et exteriorum stramineo-rubella vel nonnunquam fere straminea, ad apicem acuta, ad marginem plus minusve eroso-denticulata; extimorum ovato-triangularia, circiter 2.5 mm. longa, interiorum sensim majora. *Flores* extimi ♀ uniseriati, 2.8 mm. longi, anguste tubulosi, sursum paulum ampliati et ad apicem minute 5-lobati; ⚥ numerosissimi, 3.5 mm. longi, tubulosi, ad apicem minute 5-lobati; antherae 2 mm. longae. *Ovarium* glabrum, pappi setis circiter 2 mm. longis coronatum. *Achaenia* nondum matura.

NYASALAND: North Nyasa District: Nyika Plateau, Nchena-chena Spur, in *Brachystegia* woodlands, 80 cm. high, flowers and bracts yellow, 1400 m., Aug. 20, 1946, *17360*.

NORTHERN RHODESIA: Kalwala, local and very scattered amongst grasses in *Isoberlinia paniculata, Brachystegia spiciformis, B. longifolia, Uapaca kirkiana, Faurea, Protea* woodland on a reddish-brown sandy loam, a perennial herb up to 60 cm. high with red outer bracts to golden-yellow capitula, 1770 m., Aug. 1, 1938, *Greenway & Trapnell 5549* (Herb. Kew.). Mwinilunga District: R. Kakema S. of Mwinilunga, on grassy bank above river, perennial 60–90 cm. high, outer bracts reddish, inner golden, 24 Aug. 1930, *Milne-Redhead 964* (TYPUS in Herb. Kew.).

The marked differences in size and arrangement of the capitula enable this species to be very easily separated from its nearest relative, *H. patulifolium* Bak.

In addition there is perhaps an ecological difference between the two: while *H. milne-redheadii* is normally a plant of the miombo or *Cryptosepalum pseudotaxus* zones, *H. patulifolium* appears to be a plant of montane grasslands at normally higher altitudes, usually above 2000 m. From *H. kirkii* Oliv. & Hiern, another though not so close relative, *H. milne-redheadii* differs in the denser, shorter, spreading or recurved linear leaves ± densely asperulous above, and in the reddish-yellow or brownish-yellow outer phyllaries—a colour which in *H. kirkii* is found only in the var. *luteo-rubellum* (Bak.) Moeser. Although Moeser (Bot. Jahrb. 44: 331. 1910) describes the leaves of this variety as "supra nuda, scabra," Baker's type has the leaves rather cottony above but otherwise smooth, and is obviously *H. kirkii*. The mention of scabridity is possibly due to confusion with forms of *H. patulifolium* with reddish phyllaries.

Helichrysum (§ Polylepidea) flammeiceps Brenan, sp. nov.

H. patulifolio Baker ut videtur cognata, capitulis majoribus insigniter turbinatis valde distincta.

Herba perennis 30–50 cm. alta, valde ramosa; caules complures e caudice lignoso incrassato exorientes, erecti, 1–2.5 mm. diametro, araneosi necnon pilis nonnullis patentibus glandulosis inconspicue instructi, serius brunnei, dense foliosi, foliis marcidis ut videtur persistentibus; internodia brevissima, usque ad 3 mm. longa. *Folia* rigidula, patentia, sursum curvata, subtus albido-araneosa sed hoc indumento marginibus revolutis plus minusve occulto, supra praesertim in parte revoluta pilis haud numerosis brevibus rigidis glandulosis asperula necnon primo parce araneosa mox glabrescentia et siccitate griseo-viridia, linearia, basi sessilia et praesertim in foliis inferioribus dilatato-auriculata, ad apicem acuta et brunnea, 5–13 mm. longa, medio 0.8–1 mm. lata, suprema parum reducta, inferiora nonnunquam basim versus 4–5 mm. lata; costa supra canaliculato-impressa, subtus prominula, nervis aliis vix cernendis. *Inflorescentiae* laxe corymbosae. *Capitula* satis numerosa, pedunculos foliosos usque ad 6 cm. longos terminantia, heterogama; involucrum 1–2 cm. altum, 1–1.5 cm. latum, insigniter turbinatum; foliola glabra, scariosa, haud squarrosa, circiter 13-serialia, extima et infima 1.5 mm. longa, 0.7 mm. lata, pallide brunnea vel brunneo-rubella, ut videtur stipitem involucri efformantia; mediana sensim majora, rubella, superiora ad basim laminae pallide rubello-tincta excepta lutea, ovato-lanceolata, usque ad 9 mm. longa, 2 mm. lata, intima minora; omnia apice acuto et margine minute eroso-denticulata; capitula nonnunquam magis rubescentia vel omnino lutea. *Flores* lutei, extimi ♀ uniseriati, 3.5 mm. longi, anguste tubulosi, ad apicem minute 5-lobati; ⚥ numerosissimi, 4 mm. longi, tubulosi, ad apicem minute 5-lobati; antherae 2 mm. longae. *Ovarium* glabrum, pappi setis 4 mm. longis coronatum. *Achaenia* nondum matura.

North Nyasa District: Nyika Plateau, common in open grasslands, often gregarious, perennial herb 30–50 cm. high, dense, bushy, stems erect from a large woody stock, florets yellow, lower bracts red, upper yellow, 2340 m., Aug. 14, 1946, *17218* (TYPUS); ibid., *Van der Post s.n.* (Herb. Kew.); ibid., Kasaramba, in the grasslands of the wetter side of the Nyika, tufts scattered evenly in grassland, colour variation at random, yellow through to bronze-red, with intermediates, June 28, 1952, *G. Jackson 875* (Herb. Kew.).

A gaudily coloured and unusually attractive new species. The involucres of the type, purplish-red below and slowly shading into butter-yellow above, the imagination may liken to little gusts of flame bursting forth from the ends of the shoots. The shape of the involucre is most odd and distinctive: it tapers to its base, but there the phyllaries, instead of ending abruptly, continue downwards so as to form a stalk-like extension of the capitulum up to 0.5 cm. long. Here the phyllaries shade away from purplish-red above to a pale anaemic brown at the base itself, where they are succeeded by the uppermost foliage-leaves.

The following additional specimen, in Herb. Kew., is apparently *H. flammeiceps* in a more advanced state, with the phyllaries laxer and more squarrose:

North Nyasa District: Nyika Plateau, very common in grasslands, flowering tufts about 30 cm. in diameter and up to 50 cm. high, heads golden-yellow to reddish-yellow, Aug. 14, 1949, *P. O. Wiehe N/209*.

Helichrysum kirkii Oliv. & Hiern ex Oliv. Trans. Linn. Soc. 29: 95. *pl. 61*. 1873; Moeser, Bot. Jahrb. 44: 331. 1910.

Helichrysum milanjiense Britten, Trans. Linn. Soc. II. Bot. 4: 19. 1894; Moeser, Bot. Jahrb. 44: 342. 1910.

Blantyre District: Near Blantyre, in *Brachystegia* woodlands, herb, flowers yellow, 1000 m., May 24, 1946, *Vernay 16024*.* Zomba District: Zomba, occasional in woodlands, herb 70–90 cm. high, flowers yellow, 1150 m., May 26, 1946, *16039*. Zomba Plateau, frequent in woodlands, perennial herb 80–100 cm. high, leaves grey beneath, flowers yellow, 1430 m., May 30, 1946, *16097*. Mlanje District: Mlanje Mountain; Luchenya Plateau, locally common in open grasslands, herb 40–50 cm. high, leaves grey, plant compact, showy, base woody, flowers greenish-yellow, 2150 m., June 27, 1946, *16467*; ibid., plentiful in grasslands from 2000–2250 m., herb 30–50 cm. high, bracts greenish-yellow, erect, 2150 m., July 3, 1946, *16624*. Kota-kota District: Nchisi Mountain, frequent in *Brachystegia* woodland, shrub 60–100 cm. high, stems several, erect from a stout stock, leaves grey, bracts yellow, discs brown, 1400 m., July 26, 1946, *16900*. Mpofu, Bua River, in *Brachystegia* woodland, herb 30–40 cm. high, flowers yellow, 970 m., Aug. 1, 1946, *Vernay 17095*. North Nyasa District: Nyika Plateau, common in open grasslands, shrub 30–40 cm. high, bushy, with many stems erect from an enlarged stock, florets yellow, bracts greenish-yellow, 2350 m., Aug. 16, 1946, *17249*; ibid., Nchena-chena Spur, in *Brachystegia* woodlands, about 1 m. high, flowers dry, bracts yellow, 1500 m., Aug. 20, 1946, *17357*; ibid., frequent in grasslands, about 1 m. high, flowers and bracts yellow, 1650 m., Aug. 20, 1946, *17367*. Kasungu District: Kasungu, sporadic in *Brachystegia* woodland, perennial herb 60–80 cm. high, flowers yellow, 1000 m., Aug. 26, 1946, 17427. Kenya, Tanganyika Territory, Belgian Congo, and Nyasaland.

H. kirkii is decidedly variable in breadth and density of leaves, number of heads per stem, size of capitula and number of phyllaries. I cannot see any satisfactory reason for keeping *H. milanjiense* Britten separate.

Brass 16039 approaches the var. *luteo-rubellum* (Bak.) Moeser in having a pale dull reddish tinge on the upper part of the phyllaries, but it is hardly extreme enough to pass as the variety itself.

Helichrysum buchanani Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:) 429. 1892; Moeser, Bot. Jahrb. 44: 331. 1910.

Zomba District: Zomba Plateau, common in open grasslands, perennial herb 50–80 cm. high, grey, stems several to many, erect from a woody stock, flowers yellow, 1800 m., May 31, 1946, *16141*. Nyasaland and S. Rhodesia; also in Tanganyika Territory according to Moeser.

Helichrysum buchanani Engl. var. **majus** Brenan, var. nov.

A typo capitulis valde numerosis saepe majoribus (1–)1.3–1.5 cm. longis aggregato-corymbosis differt.

Mlanje District: Tuchila Plateau, 1830 m., Aug. 1901, *J. M. Purves 86* (Herb. Kew.). Mlanje Mountain; Luchenya Plateau, among grass and rocks, the most common species, 2130 m., Sept. 23, 1929, *J. Burtt Davy 1987* (Herb. Kew.); ibid., abundant in open grasslands, herb 30–50 cm. high, leaves grey, flowers yellow, a very showy species, 1890 m., July 6, 1946, *16701*. North Nyasa District: Nyika Plateau, in open grasslands and on edges of bogs, uncommon, perennial herb 30–50 cm. high, bushy, much branched, leaves grey, flowers yellow, bracts pale greenish-yellow, 2340 m., Aug. 14, 1946, *17216* (TYPUS varietatis).

Helichrysum nitens Oliv. & Hiern in Oliv. Fl. Trop. Afr. **3**: 350. 1877; Moeser, Bot. Jahrb. **44**: 332. 1910.

Zomba District: Zomba Plateau, common and conspicuous in open grasslands, perennial herb 60–120 cm. high, fleshy, grey, scapes reddish under the grey indumentum, flowers yellow, 1800 m., May 31, 1946, *16110*. Mlanje District: Mlanje Mountain, southwest ridge, plentiful on open grass slopes, perennial herb 40–60 cm. high, silvery-grey, solitary flowering stem erect from a clump of several leafy rosettes, flowers yellow, showy, common down to 1870 m., but not flowering there, 2200 m., June 28, 1946, *16512*. Tanganyika Territory and the Belgian Congo to Portuguese East Africa and Angola.

Helichrysum sulphureo-fuscum Bak. Kew Bull. **1898**: 151. 1898; O. Hoffm. Bot. Jahrb. **30**: 428. 1901; Moeser, Bot. Jahrb. **44**: 332. 1910.

North Nyasa District: Nyika Plateau, plentiful on disturbed ground in open grassland, herb about 30 cm. high, flowering stems numerous, radiating and ascending, flowers yellow, bracts tipped with green, 2300 m., Aug. 14, 1946, *17224*. Tanganyika Territory, Nyasaland, and S. Rhodesia.

In the past this species has been much confused with the two following, under which the characters which distinguish them from *H. sulphureo-fuscum* are given. In view of this muddle, it seems worth while enumerating here those sheets of genuine *H. sulphureo-fuscum* that I have seen (in addition to Mr. Brass' specimen above).

TANGANYIKA TERRITORY: Southern Highlands Province, Mbeya District: Mbeya Mountain, in mountain grassland, herbaceous, 2290 m., June 1933, *R. M. Davies M1* (Herb. Kew.). Mbozi, 1520 m., June 1935, *Miss H. Horsbrugh-Porter s.n.* (Herb. Mus. Brit.). Njombe District: Kinga Mountains, Djilulú Mountain, in damp grass-moorland, native name usumba, 2400 m., May 18, 1899, *Goetze 921* (Herb. Kew.).

NYASALAND: North Nyasa District: Nyika Plateau, 1830–2130 m., July 1896, *Whyte 132* (typus in Herb. Kew.).

SOUTHERN RHODESIA: Umtali District: Mount Nuza, a subdecumbent weed on cleared tree-pits, plant 20–60 cm. high, 1980 m., June 20, 1934, *H. B. Gilliland B 431* (Herb. Mus. Brit.).

Helichrysum (§ Polylepidea) brassii Brenan, **sp. nov.**

H. sulphureo-fusco Bak. affinis, foliis latioribus oblanceolatis apicem versus brevius attenuatis supra glandulosis, nervis lateralibus foliorum paucioribus et non parallelis, capitulis paulo minoribus differt.

Herba 30–45 cm. alta, e basi valde ramosa ramis adscendentibus vel rarissime (var γ) simplex et erecta; rami usque ad capitula foliosa, graciles, basim versus saepius dense albido-araneosi, superne plus minusve araneosi vel denudati et tum saepe purpurei necnon tantum pilis atropurpureis brevibus patentibus plerumque glandulosis satis dense instructi; internodia 0.5–2 cm. longa. *Folia* chartacea, patentia usque suberecta, subtus densissime albido-araneosa, supra viridia tantum saepe purpurei necnon tantum pilis atropurpureis brevibus patentibus plerumque ginantia apice acuta, inferiora oblanceolata 1.5–5 cm. longa 0.3–0.8 cm. lata, superiora sensim reducta et lanceolata; costa supra leviter impressa subtus satis prominens, nervi laterales primarii 1–2-jugi prope folii basim orti quorum unus haud procul a margine ad folii apicem percurrens, nervi laterales secundarii inter costam et primarii superne tantum conspicui, omnes supra prominuli et valde adscendentes sed haud inter se paralleli. *Capitula* terminalia, solitaria vel 1–5 ag-

gregata, heterogama; involucrum 0.8–1.2 cm. altum, circiter 0.8–1.3 cm. latum; foliola circiter 7–serialia, glabra, scariosa, interiora omnino lutea circiter 5–6 mm. longa (sed intima reducta et circiter 1 mm. longa), mediana et exteriora bicoloria apicem acutum et squarrosum versus viridi-nigra aliter luteo-straminea, extima ovato-triangularia circiter 2 mm. longa, superne sensim longiora et lanceolata, ad 7–8 mm. longa et 2–2.5 mm. lata. *Flores* extimi tantum ♀, circiter 1.75 mm. longi, apice minute 4–5–lobati; ☿ numerosissimi, 2.5 mm. longi, tubulosi, apice minute 5–lobati; antherae 1.3 mm. longae. *Ovarium* glabrum, pappi setis circiter 2 mm. longis coronatum. *Achaenia* breviter oblongo-ellipsoidea, olivacea, 0.5 mm. longa, 0.3 mm. lata.

Helichrysum brassii Brenan var. **brassii**.

Planta verisimiliter perennis, inferne valde ramosa; capitula solitaria vel pedunculos 5–10 cm. longos vel ultra terminantia.

Mlanje District: Mlanje Mountain, 2130 m., 1896, *J. McClounie 43* (Herb. Kew.). Tuchila Plateau, plant 30 cm. high, 1830 m., Aug. 1901, *J. M. Purves 71* (Herb. Kew.). Mlanje Mountain, southwest ridge, under shelter of rocks on open summit, herb 30–40 cm. high, flowers yellow, bracts black-tipped, 2400 m., June 28, 1946, *16500*; ibid., Chambe Plateau, common on shallow rocky soil in grasslands, herb 20–30 cm. high, viscid, branches reddish, flowers yellow, apex of bracts greenish-black, 2100 m., July 9, 1946, *16759* (TYPUS varietatis et speciei). Zomba District: Zomba Plateau, 1520 m., Sept. 1895, *A. Whyte s.n.* (Herb. Kew.).

Helichrysum brassii Brenan var. β **aggregatum** Brenan, var. nov.

Planta verisimiliter perennis, inferne valde ramosa; capitula ad apices caulium plerumque 2–5 aggregata, pedunculos circiter 0.4–3 cm. longos terminantia.

PORTUGUESE EAST AFRICA: Namuli, Makua country, comm. 1887, *J. T. Last s.n.* (typus varietatis in Herb. Kew.).

NYASALAND: North Nyasa District: Nyika Plateau, 2380 m., Sept. 1902, *J. McClounie 154* (Herb. Kew.).

Helichrysum brassii Brenan var. γ **tenellum** Brenan, var. nov.

Planta annua, caule simplici apice in inflorescentiam tricephalam terminante; pedunculi 0.8–1 cm. longi; foliola involucri quam in varietatibus aliis apice multo dilutius atro-tincti.

North Nyasa District: Nyika Plateau, common locally in open grasslands, annual herb 20–35 cm. high, slightly viscid, stems reddish, leaves grey beneath, flowers yellow, bracts bronze-green, 2340 m., Aug. 12, 1946, *17186* (TYPUS varietatis).

H. brassii Brenan is obviously a close relative of *H. sulphureo-fuscum* Baker and has been confused with it in the herbarium. Although the two are very much alike so far as the capitula are concerned, yet the differences in the shape, indumentum, and venation of the leaves are so striking and apparently constant that *H. brassii* must, in my opinion, be treated as a distant species. In true *H. sulphureo-fuscum* the leaves, even the basal ones, are linear and grasslike, glabrous and not glandular on the upper surface, and with very close parallel lateral nerves and veins running the length of the leaf. In *H. brassii* the oblanceolate shape particularly of the lower leaves, the short close glandular indumentum on the upper side, and the non-parallel venation showing up clearly above are easily observed on the specimens, and I have found that the separation of *H. brassii* from *H. sulphureo-fuscum* really presents no difficulty in practice.

Helichrysum (§ **Polylepidea**) **dichroölepis** Brenan, sp. nov.

H. brassii Brenan affinis, foliis supra satis dense et persistenter albido-araneosis necnon glandulos carentibus distincta; a *H. sulphureo-fusco* Bak. notulis iisdem foliorum indumento excepto quae supra sub *H. brassii* scriptae sunt differt.

Herba perennis, eglandulosa, caules numerosos decumbentes usque ad circiter 35 cm. longos et 20 cm. altos emittens; caules superne plus minusve ramosi, usque ad capitula foliosi, graciles, 1–2 mm. diametro, ubique nisi ima basi densissime ac persistenter albido-floccoso-araneosi; internodia 0.5–1.5 cm. longa. *Folia* chartacea, patentia vel capitula versus suberecta, subtus more caulium vestita, supra laxius sed satis dense araneosa et eglandulosa, basi sessilia et vaginantia apice acuta et mucronata, inferiora oblongo-oblanceolata 1.5–3.2 cm. longa 0.3–0.6 cm. lata, superiora sensim reducta et lanceolata, suprema circiter 5 mm. longa 1.5 mm. lata; costa supra leviter impressa subtus satis prominens, venatione ei *H. brassii*, q.v. supra, similis. *Inflorescentiae* laxae, 1- usque circiter 10-cephalae. *Capitula* pedunculos foliosos circiter 2.5–10 cm. longos terminantia, heterogama; involucrum circiter 1 cm. altum, 1–1.5 cm. latum; foliola circiter 7-serialia, glabra, scariosa, interiora omnino lutea circiter 7–8 mm. longa 1.5–2 mm. lata (sed intima reducta et circiter 1 mm. longa), mediana et exteriora bicoloria apicem acutum et squarrosum versus viridi-nigra aliter luteo-straminea, extima ovato-triangularia circiter 2 mm. longa, superne sensim longiora et lanceolata usque ad 10 mm. longa et 2.5 mm. lata. *Flores* extimi tantum ♀, 2 mm. longi, anguste tubulosi, sursum paulum ampliati, apice minute 4–5-lobati; ⚥ numerosissimi, 2.5 mm. longi, apice minute 5-lobati; antherae 1.2 mm. longae. *Ovarium* glabrum, pappi setis circiter 1.9 mm. longis coronatum. *Achaenia* nondum matura.

Mlanje District: Mlanje Mountain, 1891, *A. Whyte s.n.*, p.p. (Herb. Kew.), *A. Whyte 134*, p.p. (Herb. Mus. Brit.); ibid., 2130–2440 m., Mar. 1897, *G. Adamson 339* (Herb. Kew., Herb. Mus. Brit.); ibid., Luchenya Plateau, common on shallow soil in open grasslands, perennial herb 15–20 cm. high, freely branched, the many ascending branches forming compact showy masses, flowers yellow, 1890 m., July 2, 1946, *16622*; ibid., plentiful on shallow soils in open rocky grasslands, herb about 20 cm. high, of loose spreading habit, flowers yellow, tips of outer bracts blackish-green, 2240 m., July 3, 1946, *16634* (TYPUS).

H. dichroölepis is in the circle of affinity of *H. sulphureo-fuscum* Bak., and is most closely related to *H. brassii* Brenan. The leaves resemble in shape and venation those of the last-named species, but are rather densely white-cottony above and lack its short but conspicuous glandular indumentum. From *H. sulphureo-fuscum* itself the shape, venation, and cottony indumentum on the upper surface of the leaves will readily distinguish it. The three species are scarcely separable by their capitula alone and seem to form a natural group. *H. sulphureo-fuscum* extends from Tanganyika to Southern Rhodesia, and thus has the widest distribution; *H. brassii* is confined to Nyasaland and Portuguese East Africa; while *H. dichroölepis* is apparently narrowly endemic to Mlanje Mountain.

Brass 16622 has the darkening of the phyllaries less pronounced than usual.

Helichrysum setosum Harv. in Harv. & Sond. Fl. Cap. 3: 231. 1865; Moeser, Bot. Jahrb. 44: 337. 1910.

Zomba District: Zomba Plateau, occasional in open grassland, herb 1 m. high or more, plant erect and bushy, aromatic, leaves very pale green, flowers yellow, showy, 1800 m., May 31, 1946, *16120*. Kota-kota District: Nchisi Mountain, occasional among grasses edging rain-forest, herb 60–80 cm. high, annual, more or less viscid, flowers yellowish-green, 1550 m., July 30, 1946, *17043*. East Africa from Abyssinia to South Africa.

Stoebe kilimandscharica O. Hoffm. in Engl. Pflanzenw. Ost-Afr. C: 411 (1895) var. **densiflora** O. Hoffm. Bot. Jahrb. 30: 430. 1901.

Stoebe kilimandscharica sensu Levyns, Jour. S. Afr. Bot. 3: 15. 1937, pro parte; non O. Hoffm. sensu stricto.

North Nyasa District: Nyika Plateau, occasional in montane forest secondary growths and in grassland shrubberies, shrub 1 m. high, leaves greyish-green, flowers purple, 2400 m., Aug. 18, 1946, *17319*. New to Nyasaland; the var. extending northward to Kenya and Uganda.

Levyns in her revision of *Stoebe* (l.c.) does not mention the var. *densiflora*, and recognises no varieties of *S. kilimandscharica*. To me, however, var. *densiflora* appears worth distinction. Plants from Kilimanjaro and other peaks in northeastern Tanganyika have short incurved and rather appressed foliage on the mature shoots, and these represent typical *S. kilimandscharica*. From elsewhere—southern Tanganyika, Kenya, Uganda and now Nyasaland—the foliage is longer, mostly spreading and not incurved. I have not seen the type of var. *densiflora* (*Goetze 1198* from the Kinga Mountains in southwestern Tanganyika), but the description does not leave room for doubt, and there are in the Kew Herbarium gatherings from southwestern Tanganyika, where typical *S. kilimandscharica* does not seem to occur. From the description, *S. elgonensis* Mattf. Notizbl. Bot. Gart. Berlin 8: 236 (1922) is a synonym of var. *densiflora*.

Athrixia rosmarinifolia (Schultz-Bip. ex Walp.) Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 355. 1877.

Klenzea rosmarinifolia Schultz-Bip. ex Walp. Repert. 2: 973. 1843.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in grasslands, shrub 60–80 cm. high, flower-rays white, tipped with purple, disc yellow, 2150 m., July 3, 1946, *16642*; ibid., common locally in grasslands, shrub 50–60 cm. high, just coming into flower, flower-rays pinkish-purple, disc yellow, 2200 m., July 11, 1946, *16785*; ibid., common locally in grasslands, 60–80 cm. high, flowers rose-purple, 2000 m., July 18, 1946, *16871*. North Nyasa District: Nyika Plateau, Nchena-chena Spur, rare, in open grassland, shrub 60 cm. high, flower heads about 1 cm. in diameter, purple, 1700 m., Aug. 20, 1946, *17359*. Anglo-Egyptian Sudan and Abyssinia to S. Rhodesia.

Athrixia subsimplex Brenan, sp. nov.

A. nyassanae S. Moore valde affinis, caulibus procerioribus et validioribus, involucri foliolis multo brevioribus et minus caudatis, flosculis purpureis distincta.

Herba stolonifera; caules singuli vel subcaespitosim orti, praeter inflorescentias simplices vel subsimplices, crebre foliosi, erecti, 30–40 cm. alti, 1–1.5 mm. diametro, leviter angulati, brunneo-purpurei, appresse-araneosi, demum glabrescentes; internodia 1–4 mm. longa. *Folia* rigida, suberecta usque patentia vel inferne subreflexa, linearia, marginibus valde revoluta, 1.6–2.7 cm. longa, 1–2 mm. lata (foliis supremis minoribus), supra glabra nitida, subtus dense albido-araneoso-tomentosa, costa supra canaliculato-impressa subtus satis prominenti vel indumento occulta. *Capitula* apicem caulis versus satis dense aggregata, racemosim disposita, inflorescentiam circiter 3–5 cm. longam 2–3 cm. latam efficientia, turbinata, deorsum attenuata, circiter 0.8–1 cm. longa et lata; involucri foliola multiseriata, leviter araneosa, lineari-lanceolata, acuta, parte inferiore straminea, superiore brunnea vel brunneo-purpurea et ibi squarrosa, extima circiter 2 mm. longa, interiora sensim longiora ad omnino 7 mm. longa et 0.8 mm. lata, quorum pars superior brunnea 2–3 mm. longa est. *Flosculi* purpurei, ei radii 20, tubo 4 mm. longa, ligula 6 mm. longa, 2.1 mm. lata; ei disci 5–5.5 mm. longi, apicem versus sensim ampliati. *Ovarium* basi plumulosum, apicem versus setulis paucis instructum, apice ipso pappo biseriato coronatum; setae pappi exteriores brevissimae 0.3 mm. longae, interiores 4.5–5 mm. longae. *Achaenia* nondum matura.

North Nyasa District: Nyika Plateau, locally common in grasslands, shrub 30–40 cm. high, stoloniferous, mostly not yet in flower, flowers purple, 2400 m., Aug. 18, 1946, *17311* (TYPUS); ibid., *Van der Post s.n.* (Herb. Kew.)

A. subsimplex Brenan is very close to *A. nyassana* S. Moore, Jour. Linn. Soc. Bot. 35: 339 (1902), and appears to be similar in habit, but differs most conspicuously in the much shorter phyllaries. In *A. nyassana* the apical brown part of the phyllaries is about 4–6 mm. long and spirally squarrose, while here it is only about 2–3 mm. long, giving the involucre a more compact appearance. The florets of *A. nyassana* are white, in *A. subsimplex* purple.

Inula mannii (Hook. f.) Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 358. 1877.
Vernonia ? mannii Hook. f. Jour. Linn. Soc. Bot. 7: 198. 1864.
Laggera heteromalla Vatke, Linnaea **39**: 487. 1875.
Vernonia myriotricha Bak. Kew Bull. **1898**: 148. 1898.
Petrollinia heteromalla (Vatke) Chiov. Ann. di Bot. 9: 71. 1911.

North Nyasa District: Nyika Plateau, two specimens on grassy edge of montane forest, perennial herb 90–120 cm. high, flowers purplish-brown, inconspicuous, 2340 m., Aug. 19, 1946, *17335*. Abyssinia, Uganda, Kenya, Tanganyika Territory, and Nyasaland; also in the British Cameroons; restricted to mountainous regions.

Oliver and Hiern (l.c.) made *Laggera heteromalla* Vatke a synonym of *Inula mannii*. Chiovenda (l.c.) separated the two again, and made *Laggera heteromalla* the type of a new genus, *Petrollinia*, which he placed next to *Pechuel-Loeschea*. He went on to say that *Inula mannii*, of which he implied that he hadn't seen the type, differs from *Petrollinia* (translated) "at least by the larger capitula with more numerous florets, and by the pappus with more setae in 1–2 series."

After dissection of the type of *I. mannii* (Cameroon Mountain, *G. Mann*) and of the type-number of *Laggera heteromalla* (Abyssinia, *Schimper 1528*), I can only say that the supposed differences between the two are figments of the imagination. The capitula do show a certain amount of variation in size, but this, not surprisingly, is dependent on their age. Most of the capitula on Mann's specimens are rather young, but the mature ones are similar in size to those of Schimper's Abyssinian plants. On counting the number of florets per capitulum, I found 36 in both. The number of pappus-setae ranges from 29–36, and this is again the same for both. Their insertion is also identical. Hooker's original description of the setae of *I. mannii* as biseriate seems to me misleading; they are closely uniseriate but inserted along a lobulate line round the top of the ovary, so that the circle is an irregular one, not unreasonably described as one- to two-seriate.

The combination *Inula mannii* is usually said to have been made by Bentham and Hooker in the *Genera Plantarum*, but although implying that *Vernonia mannii* should be shifted to *Inula*, they do not, in fact, make the necessary combination. The first publication of *Inula mannii* seems to be in the *Flora of Tropical Africa*, and I have therefore fathered *Inula mannii* onto Oliver and Hiern.

Inula glomerata Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 359. 1877.

Blantyre District: Blantyre, in *Brachystegia* woodland, perennial herb up to 1.5 m. high, indumentum pale brown, flowers yellow, 1100 m., June 17, 1946, *16348*.* Kota-kota District: Nchisi Mountain, common in gullies in *Brachystegia* woodland, 1–1.5 m. high, stem one, simple, erect from a thick woody stock, flowers yellow, 1400 m., July 27, 1946, *16986*. Tanganyika Territory to S. Rhodesia, Angola, and the Transvaal.

Inula shirensis Oliv. Hook. Ic. Pl. *pl. 1399*. 1882.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, perennial herb 30–70 cm. high, flowers yellow, conspicuous, 1400 m., July 28, 1946, *17010*. Portuguese East Africa, Nyasaland, and N. Rhodesia.

Anisopappus africanus (Hook. f.) Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 369. 1877.

Telekia africana Hook. f. Jour. Linn. Soc. Bot. 7: 201. 1864.

Mlanje District: Mlanje Mountain; Luchenya Plateau, one plant in open grasslands, herb, flowers yellow, 1870 m., June 27, 1946, *16456*.* Kota-kota District: Nchisi Mountain, common in moist gullies in *Brachystegia* woodland, perennial herb 80–120 cm. high, rays of flower yellow, disc brownish-yellow, 1400 m., July 25, 1946, *16944*. Distribution doubtful until the segregates have been worked out; originally described from the Cameroon Mountain.

Anisopappus iodotrichus Brenan, sp. nov.

A. africano (Hook. f.) Oliv. et Hiern peraffinis, pedunculis caulibus petiolisque pilis numerosis in statu sicco plus minusve violaceo-tinctis vestitis, squamis receptaculi apice in subulam rigidam laevem acutam brevem sed conspicuam exeuntibus, squamis pappi brevissimis subaequalibus differt.

Herba ut videtur erecta, usque ad 1 m. alta; caules ut videtur singuli, inferne simplices denudati usque ad 6 mm. diametro, superne crebre ramosi, subteretes, leviter striati, ut pedunculi pilis flexuosis multicellularibus in sicco plus minusve violaceo-tinctis dense pubescentes. *Folia* rigide papyracea, ovato-cordata usque deltoideo-hastata, inferiora circiter 3–4 cm. longa 2–3.8 cm. lata, superne sensim minora, supremis valde reductis, apice obtusa, basi cordata vel hastata, opaca, utrinque sed praesertim subtus pubescentia, rete venarum supra nonnunquam impressa, subtus satis prominente, margine grosse crenata vel in foliis majoribus duplicato-crenata, crenis 1.5–6 mm. altis; petiolus foliorum inferiorum 0.7–1.8 cm. longus, more caulium vestitus, superiorum 2–7 mm. longus. *Capitula* pedunculis 0.5–6 cm. longis more caulium sed densius vestitis sine foliis vel folia unica minima bracteiformi praeditis suffulta, circiter 2–3 cm. diametro, lutea, in corymbum apicalem laxum circiter 4–20-cephalum 10–15 cm. latum aggregata; foliola involucri pauciseriata, oblongo-spathulata, 5–7 mm. longa, 1.5–3 mm. lata, intimis et extimis aliquantulum minoribus, obtusa, pubescentia, in sicco ut videtur plus minusve purpurascentia, margine praesertim eorum interiorum minute fimbriata; discus 1–1.5 cm. diametro; squamae receptaculi lanceolatae, 2.5–3 mm. longae, involutae, subintegrae, denticulis paucis supra medium positis, apice costa in subulam rigidam integram circiter 0.5–1 mm. longam excurrente. *Flores ligulati*: tubus circiter 1.25 mm. longus, extra minute glandulosus; ligula circiter 9–11 mm. longa, 2.5–3 mm. lata; ovarium 1.1 mm. longum, pappo 0.3 mm. longo coronatum. *Flores hermaphroditi* 2 mm. longi, tubo extra minute glanduloso; antherae 1 mm. longae, basi breviter caudatae; rami styli circiter 1 mm. longi, apicem rotundato-obtusum versus dilatati; ovarium circiter 1 mm. longum, glabrum, squamis pappi minutis circiter 0.15–0.3 mm. longis subaequalibus coronatum. *Achaenia* glabra, circiter 1.5–1.7 mm. longa, costis circiter 9 tenuibus longitudinalibus notata, leviter curvata, subcylindrica.

TANGANYIKA TERRITORY: Southern Highlands Province, Rungwe District: Kyimbila, in mountain grassland, flowers golden-yellow, 1350 m., Aug. 23, 1910, *Stolz 235* (TYPUS in Herb. Kew.). Poroto Mountains, in *Pteridium-Protea-Myrica* herbaceous grassland communities, frequent to fairly frequent, herb 60–75 cm. high, slightly rugose leaves, rays deep yellow, disc orange, 2010–2380 m., March 3, 1932, *G. W. St. Clair Thompson 713* (Herb. Kew.). Njombe District: Lupembe area, N. of the upper Ruhudje, May 1931, *H. J. Schlieben 902* (Herb. Kew.). Msima Stock Farm, in vlei soils, annual up to 1 m. high, yellow flowers, *H. E. Emson 274* (Herb. Kew.).

NYASALAND: North Nyasa District: Nyika Mountains, 1220–1830 m., 1896, *A. Whyte s.n.* (Herb. Kew.). Nyika Plateau, on grassy borders of forest, herb about 1 m. high, red-hairy, flowers yellow, 2300 m., Aug. 13, 1946, *17196*.

Anisopappus africanus has provided a convenient dustbin for doubtful specimens in this genus, including the present new species. While certainly a very close relative of *A. africanus, A. iodotrichus* is readily separable by the presence of violet-coloured hairs on the peduncles, stems and petioles; though varying in density, they seem always to be numerous, and retain their violet colour in a way most gratifying and convenient to the herbarium botanist. Besides these useful hairs, there is the pappus: in *A. africanus* it is comparatively well developed, of scales about 0.5–1 mm. long, varying in length on the same achene, while in *A. iodotrichus* it is very short, of scales of approximately equal length (about 0.15–0.3 mm.). A third contrasting character is to be seen in the scales of the receptacle. In *A. africanus* these are acute but the midrib is prolonged into only a short point, the shortly erose-denticulate margins of the scale being continued almost to the apex. The midrib of the scales of *A. iodotrichus* is prolonged into a pungent point about 0.5–1 mm. long, smooth and subulate, the margin ceasing well below the apex. When the heads are young the ends of the receptacle-scales project beyond the flowers, giving a bristly pincushion effect to the disc, which I have not seen in *A. africanus*. I should add that many specimens from East Africa labelled *A. africanus* which may be thought to obscure the differences given here are not in my opinion either *A. iodotrichus* or *A. africanus*.

In the Kew Herbarium there is a second (poor) sheet of *A. iodotrichus* bearing the number *Stolz 235*; the date, however, on the label is Sept. 2, 1910. This sheet has the following economic note (translated): "the leaves are powdered, put in hot water, and then placed on wounds."

Anisopappus flexuosus (Hutch.) Brenan, comb. nov.

Sphacophyllum flexuosum Hutch. Kew Bull. **1906**: 249. 1906.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in secondary forest, shrub 3-4 m. high, tall, sparingly branched, leaves viscid, flowers yellow, just beginning to open, 1880 m., July 8, 1946, *16738*; ibid., frequent in secondary forest, shrub 2–3 m. high, viscid, flowers yellow, conspicuous, 1890 m., July 10, 1946, *16745*; ibid., frequent on edges of primary forest, shrub 2 m. high, flowers yellow, showy, 1890 m., July 15, 1946, *16842*. Endemic to Mlanje District.

For the union of *Sphacophyllum* and *Anisopappus* see Humbert, Composées de Madagascar 240 (1923) and also G. Taylor, Jour. Bot. **71**: 165 (1933), opinions with which I agree.

Anisopappus flexuosus is a very close relative of another Nyasaland endemic, *Anisopappus kirkii* (Oliv.) Brenan, comb. nov. (*Sphacophyllum kirkii* Oliv. Hook. Ic. Pl. *pl. 1451*. 1884) which differs in its much more condensed inflorescence and in the reduction in size of the leaf. Whether these differences are something more than the effects of exposure remains to be finally settled.

Anisopappus tenerus (S. Moore) Brenan, comb. nov.

Sphacophyllum tenerum S. Moore, Jour. Linn. Soc. Bot. **47**: 274. 1925.

Zomba District: Zomba Plateau, scattered over an exposed rocky summit, annual herb 20 cm. high, flowers yellow, rays none, 1820 m., May 31, 1946, *16130*. Endemic to Nyasaland.

Wedelia sp.

Cholo District: Cholo Mountain, occasional in rain-forest regrowths, herb 1.5 m. high, flowers yellow, 1200 m., Sept. 19, 1946, *17650*.

Fruiting specimens are wanted for precise identification.

Aspilia vernayi Brenan, sp. nov.

Affinis ut videtur *A. brachyphyllae* S. Moore, caulibus et pedunculis sparsius et brevius pubescentibus, capitulis paulum minoribus, paleis receptaculi apice abrupte obtusis vel subacutis nervo medio atroviolaceo apicem haud attingente, margine superne eroso-ciliato, achaeniis brunneo-atropurpureis facile distinguenda; *A. zombensi* Bak., cui etiam subsimilis, foliolis involucri latioribus, paleis uninervatis ad apicem haud attenuato-acutissimis et ibi minus ciliolatis longe distat.

Herba lignescens, ut videtur erecta, usque ad 1–1.5 m. alta; caules tenues, 1–3.5 mm. diametro, crebre ramosi, breviter et persistenter scabrido-pubescentes, pilis longioribus usque ad 0.3 mm. longis; internodia (1–) 5–8 (–10) cm. longa. *Folia* rigide papyracea, ovata usque oblongo-ovata, (1.3–) 3–5 (–7) cm. longa, (0.6–) 1.2–3.3 cm. lata, ad apicem sensim acuta, ad basim rotundata, supra pilis brevibus rigidis ad basim incrassatis appressis ad apicem folii adversis satis dense aspero-pubescentia, subtus pilis tenuibus mollioribus et longioribus pubescentia, nervis basalibus 3 (–5) quorum laterales arcuato-adscendentes in partem apicalem folii percurrentes et ibi cum nervis lateralibus e nervo medio emissis arcuato-conjuncti, nervis omnibus supra inconspicuis prominulis usque impressiusculis, subtus reticulatis et prominentibus, marginibus saepe anguste revolutis plerumque sparse denticulatis; petiolus brevissimus, 1–3 mm. longus. *Capitula* mediocria ad apicem ramulorum in corymbos laxos 3–5-cephalos foliaceo-bracteatos aggregata; pedunculi capitulorum propriorum (0.5–) 2–5 (–8) longi, more caulium vestiti. *Involucrum* 5–10 mm. altum, 5–8 mm. latum, triseriatum; foliola 4 extima oblonga, basi incrassato gibboso et paulum dilatato glabra, superne herbacea et aspero-pubescentia, subacuta vel acuta, 5–10 mm. longa, 1.5–3 mm. lata; foliola interiora scariosa, elliptica vel late elliptica, 3–6 mm. longa, 1.5–4 mm. lata, haud vel vix gibbosa, superne glabra vel sparse tantum pubescentia, margine ciliolata; intima quam interiora angustiora, glabra, margine erosa. *Paleae* receptaculi scariosae, oblongae, circiter 6.5 mm. longae, 1.5–2 mm. latae, flores amplectentes, ad apicem abrupte subacutae vel obtusae, nervo unico conspicuo nigro-violaceo infra apicem desinente percursae, ad marginem minute eroso-ciliolatae aliter fere glabrae. *Flores* radii circiter 6–9, ligulati, lutei, extra puberuli, asexuales, sine stylis; ligulae 11 mm. longae, 4 mm. latae, apice bilobatae, lobis circiter 4 mm. altis; flores disci circiter 11–28, lutei, 5 mm. longi, tubo sursum sensim ampliato extra sparse puberulo; antherae 2 mm. longae, thecis atroviolaceis. *Ovarium* inferne glabrum, superne breviter pubescens, cupula minima laciniata coronatum. *Achaenia* brunnea-atropurpurea, 4–5 mm. longa, 1.5–2 mm. lata, oblonga sed superne paulum latiora et puberula, ad apicem cupula minima 0.7 cm. longa omnino exaristata coronata.

"Nyasaland, 1891," *J. Buchanan 629, 669* ex parte (Herb. Kew.). Mount Chiradzulu, 1895, *A. Whyte s.n.* (Herb. Kew.). Zomba District: Zomba Plateau, common in *Brachystegia* woodlands, woody herb 1–1.5 m. high, much branched, erect, leaves scabrous, flowers yellow, 1500 m., June 4, 1946, *16215* (TYPUS).

The present plant is certainly an *Aspilia*, as that genus is defined at present, but the difference between *Aspilia* and *Wedelia* seems a remarkably feeble one, even among Compositae, and to cut across other and to my mind more satisfactory, though probably not generic, characters.

In *Aspilia*, *A. vernayi* seems closest to *A. brachyphylla* S. Moore, but distinguished most clearly and satisfactorily by the receptacle-scales, as mentioned in the diagnosis. In *A. brachyphylla* the scales are very acute with the nerve sometimes rather dark, but not nearly so blackish as in *A. vernayi*, and, most important, reaching the apex and not ceasing below it; the margins of the scales

of *A. brachyphylla* are scarcely erose-ciliolate at the apex, as they are in *A. vernayi.*

Melanthera scandens (Schumach. & Thonn.) Brenan, comb. nov.

Buphthalmum scandens Schumach. & Thonn. Beskr. Guin. Pl. 392. 1827; non *Buphthalmum scandens* Vell. Fl. Flum. 8: 132. 1830–31?
Lipotriche brownei DC. Prodr. 5: 544. 1836.
Melanthera brownei (DC.) Schultz-Bip. Flora 27: 673. 1844.

Kota-kota District: Benga, west shore of Lake Nyasa, plentiful in moist depressions behind beach, herb 1–1.5 m. high, flowers yellow, 470 m., Sept. 2, 1946, *17501.* Widely distributed in tropical Africa.

The earliest epithet is provided by *Buphthalmum scandens* Schumach. & Thonn. and I am grateful to the authorities of the Botanical Museum at Copenhagen for sending on loan to me the good and unmistakeable type of this. Vellozo's *B. scandens* was published in the eighth volume of the *Flora fluminensis*, all of whose volumes bear the same date, 1827, which is also the year of publication of Schumacher and Thonning's *B. scandens. Prima facie* it would seem unlikely that the eleven weighty volumes of the *Flora fluminensis* were all got out in 1827, and that this suspicion is well-founded is confirmed in Rodriguésia 3: 77 et seq. (1937). In a letter dated 14 January 1950 from Fr. Thomaz Borgmeier, O.F.M., of the *Revista de entomologia*, Rio de Janeiro, to Dr. Alicia Lourteig, he writes [translated]: "From the documents I have at my disposition, I see that in November 1829 there arrived at Rio de Janeiro the plates belonging to the first volume of the *Flora fluminensis.* Thereupon there was prepared a prospectus announcing the publication of the work. The rest of the plates arrived between 1830 and July 1831. But it is not possible for me to state the exact date of each delivery."

From this it is clear that *B. scandens* Vell. was not published at least before 1830–31, and that it is a later homonym of *B. scandens* Schumach. & Thonn., which must accordingly be taken up for the African plant.

Spilanthes mauritiana (Rich. ex Pers.) DC. Prodr. 5: 625. 1836; A. H. Moore, Proc. Am. Acad. 42: 541. 1907.

Acmella mauritiana Rich. ex Pers. Syn. Pl. 2: 472. 1907.
Spilanthes acmella sensu auct. afr.; non *S. acmella* (L.) Murr.

Kota-kota District: Benga, west shore of Lake Nyasa, occasional on sandy beaches, prostrate herb, flowers yellow, 470 m., Sept. 2, 1946, *17489.* Tropical and South Africa, Madagascar, and the Mascarenes.

This has been much confused with the Asiatic plant hitherto called *S. acmella* (L.) Murr., the right name for which is *S. paniculata* Wall. ex DC.; see Koster & Philipson, Blumea 6: 349–354 (1950).

Guizotia scabra (Vis.) Chiov. Ann. Ist. Bot. Roma 8: 184. 1903 (Pirotta, Fl. Eritrea).

Veslingia scabra Vis. Nuov. Sagg. Acc. Sci. Padova 5: 269. 1840.
Guizotia schultzii Schultz-Bip. ex A. Rich. Tent. Fl. Abyss. 1: 407. 1848; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 385. 1877.
Guizotia nyikensis Bak. Kew Bull. 1898: 153. 1898.

North Nyasa District: Nyika Plateau, Nchena-chena Spur, common and conspicuous in open grasslands, herb 60–80 cm. high, somewhat viscid, flowers yellow, 2000 m., Aug. 20, 1946, *17363.* Cholo District: Cholo Mountain, abundant in marshy hollows in *Brachystegia* woodland, herb 1 m. high, flowers yellow, showy, native name (Chinyanja) sosogi, 1200 m., Sept. 26, 1946, *17822.* Widely distributed in tropical Africa.

I cannot distinguish *G. nyikensis* Bak. from *G. scabra.*

Coreopsis pinnatipartita O. Hoffm. Bot. Jahrb. 30: 432. 1901; Sherff, Field Mus. Publ. Bot. 11: 376. 1936.

Guizotia bidentoides Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 386. 1877; non *Coreopsis bidentoides* (Nutt.) T. & G. Fl. N. Am. 2: 339. 1842.

Coreopsis whytei S. Moore, Jour. Linn. Soc. Bot. 35: 348. 1902; Sherff, Field Mus. Publ. Bot. 11: 377. 1936.

Mlanje District: Mlanje Mountain, west slopes, in forest regrowths, tree or shrub 3–4 m. high, flowers yellow, showy, 1830 m., June 20, 1946, *16399*; ibid., plentiful in brushy second-growth forest, shrub 2–3 m. high, ray and disc-florets yellow, anthers brown, 1850 m., July 18, 1946, *16864*. Kota-kota District: Nchisi Mountain, on grassy edges of gulley-forests, shrub 1.5 m. high, flowers pale yellow, 1400 m., July 25, 1946, *16942*. North Nyasa District: Nyika Plateau, plentiful in second-growth montane forest of escarpment, shrub 2–3 m. high, flowers yellow, conspicuous, 2200 m., Aug. 17, 1946, *17297*. Kenya to Nyasaland.

In this species there appears to be a hairiness cline running north and south; specimens from Kenya and N. Tanganyika being densely pubescent particularly on the upper side of the foliage; those from SW. Tanganyika being in general less densely so; while in Nyasaland sparsely pubescent to glabrescent forms are prevalent. *Brass 16399, 16864, 17297* are thinly pubescent, while *16942* is densely so. The names *Coreopsis whytei* S. Moore and *Guizotia bidentoides* Oliv. & Hiern (the latter name unmentioned by Sherff) have been applied to the less pubescent plants, while a sheet at Kew of the type-number of *C. pinnatipartita* is of a relatively more pubescent plant. At present I do not consider it worth while to make varieties.

Bidens steppia (Steetz) Sherff, Bot. Gaz. 76: 82. 1923; Field Mus. Publ. Bot. 16: 542. 1937.

Coreopsis steppia Steetz in Peters, Reise Mossamb. Bot. 496. 1863.

Blantyre District: Near Blantyre, in *Brachystegia* woodland, herb 40–50 cm. high, rays and disc yellow, 915 m., May 26, 1946, *Vernay 16023*. Zomba District: Zomba Plateau, one plant in an open bog, herb 30 cm. high, flowers yellow, 1700 m., May 31, 1946, *16112*.* Mlanje District: Likubula Gorge, on moist sunny banks of river, herb 1 m. high, flowers golden-yellow, 840 m., June 20, 1946, *16383*. Cholo District: Cholo Mountain, on a path in rain-forest, 30–40 cm. high, flowers yellow, conspicuous, 1200 m., Sept. 25, 1946, *17796*. E. Africa, from Uganda to S. Rhodesia and Angola.

In the absence of ripe fruits these gatherings cannot be named varietally.

Schistostephium artemisiifolium ["artemisiaefolium"] Bak. Kew Bull. 1897: 270. 1897.

Schistostephium microcephalum Bak. Kew Bull. 1897: 270. 1897.

Schistostephium crataegifolium sensu Hutch. Kew Bull. 1916: 102. 1916, p. p.; non *S. crataegifolium* (DC.) Fenzl ex Harv.

Kota-kota District: Nchisi Mountain, frequent in *Brachystegia* woodland, perennial herb 80–120 cm. high, flowers yellow, 1400 m., July 24, 1946, *16898*. Tanganyika Territory to S. Rhodesia.

The cutting of the leaves of *S. artemisiifolium*, with their narrow and rather elongate parallel-sided segments, which are entire or sometimes again sparsely divided into similar lobes, is so different from the shorter segments with numerous short but very acute lobes of *S. crataegifolium* that I prefer to consider them distinct.

Lopholaena whyteana (Britten) Phill. & C. A. Sm. Trans. Roy. Soc. S. Afr. 21: 236, 1933.

Othonna whyteana Britten, Trans. Linn. Soc. II. Bot. 4: 21. *pl. 4, f. 1, 2*. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common in grasslands from about 2000 to 2250 m., shrubs 40–50 cm. high, with numerous stems from a common base forming a shapely bush, involucral bracts yellow-green with reddish tips, florets white, 2100 m., July 3, 1946, *16645*. Endemic to Nyasaland.

Phillips and C. A. Smith (op. cit. p. 236) identify as *L. whyteana* a specimen, *Haarer 1586*, from southwestern Tanganyika Territory, which I should call *L. dolichopappa* (O. Hoffm.) S. Moore, on account of its decumbent not erect habit and smaller capitula on longer peduncles. *L. whyteana* is thus still a Nyasaland endemic.

Cineraria buchanani S. Moore, Jour. Linn. Soc. Bot. 35: 352. 1902.

Mlanje District: Mlanje Mountain; Luchenya Plateau, plentiful on forest margins, herb scrambling to 1.5–2 m. high, flowers yellow, 1890 m., July 6, 1946, *16697*. Endemic to Nyasaland.

Cineraria buchanani S. Moore var. ?

Leaves more deeply divided and sometimes a pair of lobes on the petiole (=*Purves 93*, Tuchila Plateau).

Mlanje District: Mlanje Mountain; Luchenya Plateau, one plant in grassland, herb 30 cm. high, flowers yellow, 2200 m., July 3, 1946, *16636*.*

Cineraria deltoidea Sond. Linnaea 23: 68. 1850.

North Nyasa District: Nyika Plateau, frequent on shrubby borders of montane forest and on disturbed ground in open grasslands, shrub 1 m. high, flowers yellow, 2350 m., Aug. 17, 1946, *17299*. Natal, the Transvaal, and now new to Nyasaland.

Cineraria monticola Hutch. Kew Bull. 1931: 251. 1931.

North Nyasa District: Nyika Plateau, on shrubby banks of a grassland stream, herb 1 m. high, flowers yellow, 2300 m., Aug. 14, 1946, *17225**; ibid., common in shallow rocky soil in grasslands, shrub 30–40 cm. high, flowers showy, yellow, 2500 m., Aug. 18, 1946, *17322*.

Previously recorded from the Transvaal. The present gatherings differ in habit and inflorescence, possibly owing to habitat, but in little else.

Emilia basifolia Bak. Kew Bull. 1898: 154. 1898; Garabedian, Kew Bull. 1924: 137, 140. 1924.

Zomba District: Zomba Plateau, on moist rocks on edge of a waterfall, herb 15–20 cm. high, flowers yellow, 1500 m., June 7, 1946, *16313*. Nyasaland, N. Rhodesia, and the Belgian Congo.

Emilia macaulayae Garabedian, Kew Bull. 1924: 138, 140. 1924.

Blantyre District: Blantyre, in *Brachystegia* woodland, herb 70–100 cm. high, flowers red, 1100 m., June 17, 1946, *16350*. N. Rhodesia, and now new to Nyasaland.

Senecio abyssinicus Schultz-Bip. ex A. Rich. Tent. Fl. Abyss. 1: 438. 1848; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 410. 1877.

Zomba District: Zomba Plateau, occasional on paths in *Brachystegia* woodland, herb 30–40 cm. high, more or less fleshy, leaves pale green, flowers yellow, 1500 m., June 6, 1946, *16282*. Abyssinia and Anglo-Egyptian Sudan to Nyasaland, S. Rhodesia, and Angola.

Senecio hochstetteri Schultz-Bip. ex A. Rich. Tent. Fl. Abyss. 1: 435. 1848; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 414. 1877.

Zomba District: Zomba Plateau, common in *Brachystegia* woodland, herb 140 cm. high, viscid, just coming into flower, flowers green with purple tinge, 1500 m., June 4, 1946, *16214*.* Abyssinia to Nyasaland and S. Rhodesia.

This greatly resembles in habit the S. African *S. purpureus* L., which however has more prominently ribbed glabrous achenes.

Senecio erubescens Ait. Hort. Kew. 3; 190. 1789, sensu lato.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional on grassland paths, herb 20–40 cm. high, flowers purple, 2000 m., July 18, 1946, *16872*. Nyasaland, S. Rhodesia, and Angola to S. Africa.

Senecio latifolius DC. Prodr. 6: 387. 1838.

Zomba District: Zomba Plateau, one plant in *Brachystegia* woodland, herb 1 m. high, leaves glaucous, more or less fleshy, flowers yellow, 1500 m., June 6, 1946, *16284*.* Nyasaland and N. Rhodesia to S. Africa.

Senecio karaguensis O. Hoffm. in Engl. Pflanzenw. Ost-Afr. C: 417. 1895.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, perennial herb 80–100 cm. high, stem one, erect, simple, flowers yellow, 1400 m., July 24, 1946, *16896*; ibid., sporadic in moist gullies in *Brachystegia* woodland, perennial herb 80–100 cm. high, stem simple, erect, leaves fleshy, flowers yellow, 1400 m., July 25, 1946, *16943*; ibid., frequent in gullies in *Brachystegia* woodland, perennial herb 80–120 cm. high, flowers yellow, 1400 m., July 27, 1946, *16985*. Urundi, Uganda, and Tanganyika Territory, and now new to Nyasaland.

Owing to the scanty and usually fragmentary material from other parts of its range, the limits of variation in *S. karaguensis* are still rather problematical. The Nyasaland specimens run to radical leaves with a broadly elliptic lamina to about 15–25 cm. long and 5–10 cm. wide with long slender petioles 12–40 cm. long. *S. karaguensis* from elsewhere seems normally to have narrower, more linear-lanceolate leaves up to about 30 × 3 cm. But the radical leaves are certainly variable, even on one plant, and the variation mentioned above may be simply due to the season when the plants were collected Therefore I prefer to treat *S. karaguensis* for the present as rather an aggregate, without attempting to make varieties. I strongly suspect that *S. tabulicolus* Bak. Kew Bull. 1898: 155 (1898) should also be sunk. It is certainly very obviously related and close, but has more capitula in the corymb and smaller involucres than *S. karaguensis*, but unfortunately the type lacks radical leaves.

Senecio wollastoni S. Moore, Jour. Linn. Soc. Bot. 38: 264. 1908.

North Nyasa District: Nyika Plateau, common in semi-shade in montane forest, annual herb 1–1.5 m. high, stem erect, simple, purple, flowers yellow, 2350 m., Aug. 17, 1946, *17301*. Uganda ("E. Ruwenzori") and now new to Nyasaland.

Brass 17301 closely resembles the type of *S. wollastoni*, which I have examined in the herbarium of the British Museum (Natural History), differing only in the glabrescence of the peduncles and basal phyllaries, which latter are elongate, linear and flexuous-spreading, not short and up to about 2.5 mm. long. At present I do not consider these discrepancies of much account.

Senecio maranguensis O. Hoffm. in Engl. Pflanzenw. Ost-Afr. C: 418. 1895.

Senecio psiadioides O. Hoffm. Bot. Jahrb. 30: 436. 1901.
Senecio jugicola S. Moore, Jour. Linn. Soc. Bot. 38: 264. 1908.

Mlanje District: Mlanje Mountain; Luchenya Plateau, in forest regrowths, shrub 2–2.5 m. high, flowers yellow, 1820 m., June 25, 1946, *16415*. Uganda to Nyasaland, from which it is now recorded for the first time.

For the moment the wisest course seems to be to allow a rather wide range of variation to *S. maranguensis*. The Nyasaland material shows leaves more or less cuneate at base, petioles auriculate at base, and often some additional foliaceous lobules on the petiole itself; the phyllaries are very slightly longer than elsewhere. These do not seem to reflect more than local variation, which it may be possible to classify more satisfactorily in the future. The following specimen in the Kew Herbarium is the same as *Brass 16415*:

Mlanje District: Tuchila Plateau, plant 60–90 cm. high, flowers yellow, 1830 m., Aug. 1901, *J. M. Purves 65.*

Senecio syringifolius O. Hoffm. Bot. Jahrb. 20: 236. 1894.

Senecio exsertiflorus Bak. Kew Bull. **1898**: 154. 1898.
Senecio nyikensis Bak. Kew Bull. **1898**: 154. 1898; non *S. nyikensis* Bak. Kew Bull. **1897**: 271. 1897.
Senecio subpetitianus Bak. Kew Bull. **1898**: 303. 1898.

Zomba District: Zomba Plateau, climbing on swampy edge of rain-forest, vine 6–8 m. high, fruit-pappus white, 1770 m., May 31, 1946, *16117*. North Nyasa District: Nyika Plateau, frequent on edges of montane forest, vine climbing 6–10 m., leaves more or less fleshy, florets greenish-white, anthers and stigmas yellow, 2320 m., Aug. 16, 1946, *17236*. Uganda, Kenya, Tanganyika Territory, and Nyasaland.

Near *S. tamoides* DC. Prodr. 6: 403 (1838), but with discoid capitula.

Senecio rectiramus Bak. Kew Bull. 1898: 155. 1898.

Kota-kota District: Nchisi Mountain, common on edge of rain-forest, vine climbing to a height of 10 m. by means of sensitive petioles, leaves grey below, flowers yellow, 1400 m., July 27, 1946, *16987*. Endemic to Nyasaland.

Senecio auriculatissimus Britten, Trans. Linn. Soc. II. Bot. 4: 21. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on banks of stream in forest, subscandent shrub 2–3 m. high, more or less fleshy, just coming into flower, flowers yellow, 1900 m., July 3, 1946, *16635*.* Endemic to Nyasaland.

Senecio milanjianus S. Moore, Jour. Linn. Soc. Bot. 35: 359. 1902.

Senecio tropaeolifolius O. Hoffm. Bot. Jahrb. **30**: 437. 1901; non *S. tropaeolifolius* MacOwan, Hook. Ic. Pl. *pl. 1011.* 1867.
Senecio conradi Muschl. Bot. Jahrb. **43**: 43. 1909.

Mlanje District: Mlanje Mountain, southwest ridge, frequent on flat dry rocks, herb 40–60 cm., flowers bright yellow, showy, plant very fleshy, 1 or 2 stems erect from a tuberous stock, 2400 m., June 28, 1946, *16496*; Luchenya Plateau, common epiphyte in forest, 30–50 cm. high, fleshy, simple, erect, flowers yellow, showy, 1820 m., July 5, 1946, *16677*.* Tanganyika Territory and Nyasaland.

S. Moore distinguishes his *S. milanjianus* from *S. tropaeolifolius* O. Hoffm. by the homogamous heads and more lobed leaves. The capitula on the type-specimen of *S. milanjianus* are so ancient and over-ripe, that I feel that too much hope and intuition entered into the confident assertion of their homogamy; especially as two excellent gatherings from Mlanje Mountain *(Brass 16677, Purves 53)* agree very well with the type of *S. milanjianus* except for their obviously radiate heads. At present I am not inclined to give specific importance to the degree of lobing of the leaves.

Senecio peltophorus Brenan, sp. nov.

Affinis est *S. milanjiano* S. Moore, sed ut videtur terrestris nec epiphyticus vel saxicolus, foliis multo minoribus, bracteis supremis et bracteolis brevioribus, capitulis multo minoribus, flosculis paucioribus, ligulis et pappo brevioribus differt.

Herba perennis, glabra, carnosa, 12–40 cm. alta, caulibus erectis e rhizomate crasso ramoso siccitate albido circiter 0.6–1 cm. diametro exorientibus; folia

omnia basalia vel caulis usque ad circiter 10 cm. supra basim foliosus, superne foliis valde reductis vel squamiformibus tantum praeditus. *Folia* inferiora petiolata, peltata; lamina siccitate rigide papyracea, ovato-suborbicularia usque suborbicularia, ad marginem breviter angulata, angulis circiter 10, magnitudine variabilia, 1–3 cm. longa, 0.9–2.3 cm. lata, supra opaca et siccitate brunnea, subtus pallidiora vivo grisea, nervis primariis circiter 8 ab apice petioli palmatim radiantibus supra valde inconspicuis subtus prominulis, venulis utrinque aegre cernendis; petiolus 1.7–3 cm. longus, ima basi plus minusve dilatatus, 2–7 mm. supra basim laminae insertus. *Inflorescentiae* terminales necnon ex axillis squamarum caulinarum supremarum orientes, aliae satis dense corymbosae multicapitulatae 4.5–12 cm. longae, aliae etiam valde reductae 1.5–3 cm. longae 1-usque paucicapitulatae; bracteae superiores et bracteolae lineari-lanceolatae usque lineares, 1.5–5 mm. longae; pedunculi capitulorum tenuiusculi, 4–10 mm. longi, bracteolati. *Capitula* heterogama, radiata; involucrum subcylindricum, 4 mm. altum, ad apicem 2.5–3 mm. latum; foliola 7–8, lineari-oblonga, ad apicem acuta puberula purpurascentia. *Flores radii* 4–5, tubo 3–3.5 mm. longo, ligulae oblongo-ellipticae, 4.5–5 mm. longae 1.5–2.1 mm. latae, ad apicem tridenticulatae; flores disci 10–11, 3 mm. longi, tubulosi, tubo sursum gradatim ampliato et ibi breviter 5-lobato; antherae 1.25 mm. longae; styli rami ad apicem truncati et minute penicillati. *Ovarium* omnium florum oblongo-fusiforme, 1.75–2 mm. longum, 0.5 mm. latum, dense et breviter pubescens, ad apicem pappi setis albidis scabridulis 3–3.5 mm. longis coronatum. *Achaenia* pallide brunnea, 1.75 mm. longa, 0.6 mm. lata, tenuiter costulata, more ovarii vestita.

Mlanje District: Mlanje Mountain, 2440–2740 m., Mar. 1897, *G. Adamson 427* (Herb. Kew.). Mlanje, Tuchila Plateau, plant found on damp rocky places, 1830 m., May 1901, *J. M. Purves 10* (TYPUS in Herb. Kew.). Mlanje Mountain, southwest ridge, locally gregarious on open mossy seepage slopes, herb 15–20 cm. high, rhizome thick, branched, plant fleshy, leaves grey beneath, flowers yellow, 2120 m., June 28, 1946, *16508*.

S. peltophorus is very obviously and closely related to *S. milanjianus* S. Moore (*q.v.*), and it is rather difficult to indicate points other than differences in size and number in which the two differ. The differences in size are so numerous and striking, affecting particularly the capitula and florets, and the material available sorts so neatly into the two, that I feel that *S. peltophorus*, which might be well described as a miniature of *S. milanjianus*, should stand as a separate species. To make the contrast between the two easier and more graphic, I have tabulated the more striking differences.

	S. milanjianus	*S. peltophorus*
Largest lower cauline leaves on each plant.	6–8 cm. in diam.	1–3 cm. in diam.
Bracteoles on peduncles of capitula	3–6 mm. long	1–2 mm. long
Involucre	0.9–1 cm. long, 0.5–0.6 cm. wide	0.4 cm. long, 0.25–0.3 cm. wide
Ligules	8–9 mm. long	4.5–5 mm. long
Number of disc-florets per capitulum	about 17–22	about 10–11
Length of disc-florets	8 mm.	3 mm.
Lobes of disc-florets	1.5 mm. deep	0.6 mm. deep
Anthers	2.5 mm. long	1.25 mm. long
Pappus	7–8 mm. long	3.–3.5 mm. long

In addition it appears that *S. milanjianus* is an epiphyte or on rocks, while *S. peltophorus* grows on the ground.

Senecio pachyrhizus O. Hoffm. Bot. Jahrb. 30: 435. 1901.

Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb 30–35 cm. high, young shoots flowering after the burning of the grass, rootstock large, woody, flowers cream, 1600 m., Sept. 9, 1946, *17602*. New to Nyasaland; previously recorded only from Tanganyika Territory.

Brass 17602 shows charred and tattered relics of mature foliage, which has not been described for this species. The leaves are at least 45 cm. long, probably narrow, about 4 cm. wide with toothed margins, more or less densely cottony beneath.

Crassocephalum rubens (Jacq.) S. Moore, Jour. Bot. 50: 212. 1912.

Senecio rubens Jacq. Hort. Vindob. 3: 50. *pl. 98.* 1776.
Senecio cernuus L. f. Suppl. 370. 1781, nom. illegit.
Crassocephalum cernuum (L. f.) Moench, Meth. 516. 1794.
Gynura cernua (L. f.) Benth. in Hook. Niger Fl. 437. 1849.
Gynura rubens (Jacq.) Muschl. Repert. Sp. Nov. 11: 119. 1913.

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, herb 80–100 cm. high, flowers blue, 1500 m., June 7, 1946, *16318*; ibid., frequent in *Brachystegia* woodlands and as a weed on disturbed ground, perennial herb up to 1 m. high, flowers purple, 1500 m., June 9, 1946, *16326*. Widely spread as a weed in the tropics.

The flowers of *C. rubens* may be pink, magenta, purplish, or blue, whilst a white-flowered form has been known to occur.

Crassocephalum bojeri (DC.) Robyns, Fl. Spermat. Parc Nat. Albert 2: 544. 1947.

Senecio bojeri DC. Prodr. 6: 376. 1838.
Senecio subscandens Hochst. ex A. Rich. Tent. Fl. Abyss. 1: 434. 1847.

Cholo District: Nswadzi River, common on grassy riverbanks, scrambling herb 2 m. high, sap not milky, branches blotched with purple, flowers yellow, native name (Chinyanja) moleza, 840 m., Sept. 27, 1946, *17848*. Eritrea to S. Rhodesia and Angola.

Crassocephalum mannii (Hook. f.) Milne-Redhead, Kew Bull. 1950: 377. 1950.

Senecio mannii Hook. f. Jour. Linn. Soc. Bot. 6: 14. 1862.
Senecio multicorymbosus Klatt, Ann. Naturh. Hofmus. Wien 7: 103. 1892.
Senecio acervatus S. Moore, Jour. Linn. Soc. Bot. 40: 121. 1911.
Crassocephalum multicorymbosum (Klatt) S. Moore, Jour. Bot. 50: 211. 1912.

Kota-kota District: Chenga Hill, in bush growths among rocks, arborescent shrub 3.5 m. high, aromatic, branches upright, fleshy, flowers yellow, 1600 m., Sept. 9, 1946, *17597*. Cholo District: Cholo Mountain, plentiful in rain-forest regrowths, tree up to more or less 8 m. high, branchlets and leaves fleshy, flowers yellow, 1200 m., Sept. 21, 1946, *17721*. Widely spread on mountains from the Cameroons to S. Rhodesia.

In keeping *Crassocephalum* Moench as a genus distinct from *Gynura* Cass., I am following Spencer Moore (l.c. 210). The differences between the style structures of *Crassocephalum* and *Gynura* are similar in degree to the differences between the style structure of either of these genera and that of *Senecio* L. The only other logical treatment is to consider both *Crassocephalum* and *Gynura* as subgenera of *Senecio*, a treatment which has been followed by German botanists, but with which I am not in agreement.

Osteospermum monocephalum (Oliv. & Hiern) Norlindh, Stud. Calend. 1: 288. 1943.

Tripteris monocephala Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 424. 1877.

Dowa District: Mweru Hill, weed in gardens, herb 50–60 cm. high, flowers yellow, fruit-wings red, 1450 m., Aug. 5, 1946, *Shortridge 17139.* North Nyasa District: Nyika Plateau, plentiful in open grasslands, perennial herb 15–30 cm. high, young flowering stems appear after burning of grasslands, plant somewhat viscid, flowers yellow, showy, 2400 m., Aug. 11, 1946, *17162.* Kota-kota District: Nchisi, in *Brachystegia* woodland, perennial herb 30–60 cm. high, young shoots flowering after the burning of the grass, flowers yellow, fruits 3-winged, wings red, 1350 m., Sept. 9, 1946, *17576.* Urundi and Tanganyika Territory to S. Rhodesia and Angola.

Chrysanthemoides monilifera (L.) Norlindh,[38] Stud. Calend. **1**: 374 (1943) subsp. **septentrionalis** Norlindh, Stud. Calend. **1**: 396. 1943.

Mlanje District: Mlanje Mountain, west slope, in forest regrowths, shrub 1.5 m. high, leaves dull pale green, somewhat fleshy, flowers yellow, fruit—"achenes"—more or less fleshy, 1830 m., June 21, 1946, *16397*; Luchenya Plateau, among rocks in grassland, not common, tree 2 m. high, flowers yellow, fruit purple, fleshy, 2100 m., July 3, 1946, *16649.* ? District: North Road between Mzimba and Kasungu, on stony soil in *Brachystegia* woodlands, shrub 1 m. high, flowers yellow, fruit more or less fleshy, purplish, 1400 m., Aug. 23, 1946, *17386.* The subspecies in Tanganyika Territory, Nyasaland, Portuguese East Africa, and S. Rhodesia.

Gazania pygmaea Sond. Linnaea **23**: 69. 1850.

Kota-kota District: Chenga Hill, young shoots flowering after burning of the grass, perennial herb to 25 cm. high, leaves grey beneath, flowers yellow, 1600 m., Sept. 9, 1946, *17590.* Nyasaland to South Africa.

G. pygmaea may not be distinct from the earlier but little-known *G. serrulata* DC. Prodr. **6**: 512 (1838).

Berkheya insignis (Harv.) Thell. Viert. Nat. Ges. Zürich **74**: 129. 1929.
Stobaea insignis Harv. in Harv. & Sond. Fl. Cap. **3**: 496. 1865.

Kota-kota District: Nchisi Mountain, sporadic in *Brachystegia* woodland, perennial herb 50 cm. high, flowers yellow (only one plant found in flower), 1400 m., July 26, 1946, *16954.** Nchisi, in *Brachystegia* woodland, perennial herb 30–50 cm. high, roots tuberous, young shoots flowering after burning of the grass, flowers yellow, showy, 1350 m., Sept. 9, 1946, *17574.* Nyasaland to South Africa.

Berkheya johnstoniana Britten, Trans. Linn. Soc. II. Bot. **4**: 22. 1894.

Mlanje District: Mlanje Mountain; Luchenya Plateau, plentiful along trails in grassland, perennial herb 20–40 cm. high, past flowering, 2200 m., July 3, 1946, *16637.** Endemic to Nyasaland.

Berkheya polyacantha Bak. Kew Bull. **1898**: 156. 1898.
Berkheya parvifolia Bak. Kew Bull. **1898**: 155. 1898.

North Nyasa District: Nyika Plateau, frequent near paths in open grassland, perennial herb 40–50 cm. high, roots tuberous, flowers yellow, 2300 m., Aug. 16, 1946, *17246.* Endemic to Nyasaland.

I cannot distinguish Baker's two species. When they are amalgamated I propose that the name *B. polyacantha* be chosen, as the type of that is more satisfactory. Although Baker described the achenes of *B. polyacantha* and *B. parvifolia* as glabrous, the types of both have them densely pubescent.

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[38] *Osteospermum moniliferum* L. Sp. Pl. 923. 1753.

Centaurea ? praecox Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 438. 1877; Philipson, Jour. Bot. **77**: 231. 1939.

Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb to 60 cm. high, rootstock woody, deeply rooted, young shoots flowering after burning of the grass, florets white with purple anthers, 1600 m., Sept. 9, 1946, *17595*.* Widely distributed in tropical Africa, but not previously recorded from Nyasaland, though there is at Kew a very poor, leafless Nyasaland specimen that may be *C. praecox.*

The separation of *C. praecox* from *C. rhizocephala* Oliv. & Hiern seems scarcely possible without mature foliage, which is too imperfectly shown by Mr. Brass' specimen.

Pleiotaxis pulcherrima Steetz in Peters, Reise Mossamb. Bot. 500. *pl. 51.* 1863; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 440. 1877; S. Moore, Jour. Bot. 63: 44. 1925.

Blantyre District: Blantyre, in *Brachystegia* woodland, perennial herb 25–30 cm. high, stems several, erect, stem and lower side of leaves greyish, flower faded, colour not seen, 1100 m., June 17, 1946, *16337*. Tanganyika Territory to Angola; new to Nyasaland.

Dicoma sessiliflora Harv. in Harv. & Sond. Fl. Cap. 3: 518. 1865; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 444. 1877; F. C. Wilson, Kew Bull. **1923**: 386. 1923.

Blantyre District: Blantyre, in *Brachystegia* woodland, herb 40 cm. high, flowers yellow, 1100 m., June 17, 1946, *16344*.* Kota-kota District: Nchisi Mountain, occasional in *Brachystegia* woodland, perennial herb 60–80 cm. high, flowers yellow, outer bracts green with white margins and purple tips, inner bracts white, 1400 m., July 24, 1946, *16901*. Mpofu, Bua River, herb in *Brachystegia* woodland, 975 m., Aug. 1, 1946, *Vernay 17093*. The Anglo-Egyptian Sudan, southward to S. Rhodesia and westward to Nigeria.

Dicoma pygmaea Hutch. Bot. S. Afr. 526. 1946.

Kasungu District: Kasungu, hidden among long grass in *Brachystegia* woodland, herb 4–7 cm. high, flowers yellowish-green, bracts green with white margins, 1000 m., Aug. 26, 1946, *17425*. Nyasaland and N. Rhodesia; possibly in Tanganyika Territory.

Gerberia[39] **abyssinica** Schultz-Bip. ex A. Rich. Tent. Fl. Abyss. 1: 458. 1848; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 445. 1872.

North Nyasa District: Nyika Plateau, sporadic in open grassland, perennial herb 10–15 cm. high, flowering shoots appearing after the burning of the grass, flowers pink, 2400 m., Aug. 11, 1946, *17163**; ibid., plentiful in open grasslands, perennial herb, flowers pink, 2560 m., Aug. 18, 1946, *17312*.* Kota-kota District: Chenga Hill, sporadic in low open *Brachystegia* woodland, perennial herb to 30 cm. high, young shoots flowering after the burning of the grass, flowers pale purple, 1600 m., Sept. 9, 1946, *17599*. Abyssinia to Nyasaland and S. Rhodesia.

Gerberia piloselloides (L.) Cass. Dict. Sci. Nat. **18**: 461. 1820; Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 445. 1877.

Arnica piloselloides L. Pl. Afr. Rar. 22. 1760.

Dedza District: Dedza, common in moist depressions in *Brachystegia* woodland, perennial herb about 30 cm. high, flowers and young leaves produced after the burning of the grass, flower-rays reddish-purple, disc white, 1500 m., Sept. 13, 1946, *17630*. Widespread in tropical and S. Africa, and extends to Madagascar and through Asia to China.

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[39] This is the spelling adopted by Cassini in Dict. Sci. Nat. **18**: 459 (1820), and is evidently deliberate.

Crepis newii Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 449 (1877) subsp. **typica** Babcock, Genus *Crepis* 2: 370. 1947.

Kota-kota District: Nchisi, one plant collected on a path in *Brachystegia* woodland, perennial herb 40–50 cm. high, flowers yellow, 1350 m., Aug. 1, 1946, *17076**; ibid., in *Brachystegia* woodland, perennial herb about 60 cm. high, flowering after burning of the grass, sap milky, flowers yellow, 1350 m., Sept. 9, 1946, *17573*. The species from Tanganyika Territory to Angola and Nigeria.

These specimens came nearest to the "minor variant" of *C. newii* described by Babcock (l.c.) from specimens collected by Haarer in southwestern Tanganyika Territory.

Lactuca praecox R. E. Fr. Wiss. Ergebn. Schwed. Rhod.-Kongo Exp. 352. 1914.

Kota-kota District: Chintembwe, common in rocky grassland, perennial herb 10–30 cm. high, young shoots flowering after burning of the grass, flowers yellow, sap milky, 1400 m., Sept. 9, 1946, *17581*. Tanganyika Territory and N. Rhodesia; new to Nyasaland.

Lactuca glandulifera Hook. f. Jour. Linn. Soc. Bot. 7: 203 (1864) var. **calva** (R. E. Fr.) Robyns, Fl. Spermat. Parc Nat. Albert 2: 606. 1947.

Lactuca glandulifera Hook. f. f. *calva* R. E. Fr. Acta Horti Berg. 9: 162. 1929; Stebbins, Bull. Jard. Bot. Brux. 14: 350. 1937.

Cholo District: Cholo Mountain, in rain-forest regrowths, scrambling herb 1.5 m. high, sap milky, flowers yellow, 1200 m., Sept. 19, 1946, *17656*. The species in E. Africa from Uganda to Nyasaland, for which this is the first record; also in the British Cameroons.

Sonchus schweinfurthii Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 458. 1877; R. E. Fr. Acta Horti Berg. 8: 98. 1925.

North Nyasa District: Nyika Plateau, scrambling on forest edges, herb 2 m. high, sap milky, flowers yellow, 2300 m., Aug. 11, 1946, *17173*; common on Mlanje Mountain, where it was not seen in fertile condition. Widespread in tropical Africa.

Sonchus exauriculatus (Oliv. & Hiern) O. Hoffm. in Engl. Pflanzenw. Ost-Afr. C: 421. 1895; R. E. Fr. Acta Horti Berg. 8: 110. 1925.

Sonchus bipontini Asch. var. *exauriculatus* Oliv. & Hiern in Oliv. Fl. Trop. Afr. 3: 459. 1877.

Chikwawa District: Chikwawa, occasional on dry eroding river-banks, herb 40–60 cm. high, sap milky, flowers yellow, 200 m., Oct. 2, 1946, *17900*. Anglo-Egyptian Sudan and Somaliland to Nyasaland and Portuguese East Africa.

CAMPANULACEAE[39a]

Lobelia blantyrensis E. Wimm. Ann. Naturh. Mus. Wien 56: 363. 1948.

Mlanje District: Mlanje Mountain, southwest ridge, sprawling in shelter of rocks, herb, stems about 60 cm. long, flowers blue, 2400 m., June 28, 1946, *16491*; Luchenya Plateau, amongst sheltering rocks in grassland, rare, herb 30–50 cm. high, erect or ascending, leaves purple beneath, flowers violet, 2150 m., July 9, 1946, *16749*. Endemic to Nyasaland.

[39a] Determinations of *Lobelia* by F. E. Wimmer, Vienna.

Lobelia brassiana E. Wimm. Kew Bull. 1952: 139. 1952.

Zomba District: Zomba, massed on moist banks in ravines, herb, flowers blue, 1150 m., May 27, 1946, *16040* (TYPUS). Endemic to Nyasaland.

Lobelia intertexta Bak. Kew Bull. 1898: 157. 1898; Hook. f. Bot. Mag. *pl. 7615.* 1898.

Mlanje District: Mlanje Mountain; Chambe Plateau, common on grassland paths, herb 10–30 cm. high, flowers bright blue, 2000 m., July 9, 1946, *16769.* Kotakota District: Nchisi Mountain, occasional among rocks in *Brachystegia* woodland, herb, flowers blue, 1600 m., July 26, 1946, *16972.* Cholo District: Cholo Mountain, in a clearing on edge of rain-forest, herb 25–40 cm. high, flowers blue, 1200 m., Sept. 21, 1946, *17699.* Endemic to Nyasaland.

Professor Wimmer annotates *Brass 16769* as "accedens ad f. aridam."

Lobelia trullifolia Hemsl. in Oliv. Fl. Trop. Afr. 3: 466. 1877.

Zomba District: Zomba, gregarious on moist banks in ravine, herb 20–40 cm. high, plant pubescent, lower leaves reddish, flowers blue, 1150 m., May 26, 1946, *16031.* Endemic to Nyasaland.

Lobelia ? mildbraedii Engl. Wiss. Ergebn. Deutsch. Zentr.-Afr.-Exp. 1907–08 2: 344. 1911; E. A. Bruce, Kew Bull. 1934: 73. 1934.

North Nyasa District: Nyika Plateau, common in open marshes, shrub 1.5–2.5 m. high, branches several, radiating and ascending, terminating in tall erect inflorescences, only young leafy branches and dry inflorescences seen, dry hollow stems 1–1.5 m. long, below a flower-bearing part 50–90 cm. long, sap milky, flowers not seen, 2340 m., Aug. 13, 1946, *17211.* *L. mildbraedii* has been previously recorded from the Belgian Congo and Uganda.

Cephalostigma erectum (Roth) Vatke, Linnaea 38: 699. 1874.

Dentella erecta Roth, Nov. Pl. Sp. Ind. Or. 140. 1821; Cham. & Schlecht. Linnaea 4: 151. 1829.

Wahlenbergia perotifolia Wight & Arn. Prodr. Fl. Penins. Ind. 1: 405. 1834; Wight, Icon. 3: *pl. 842.* 1943.

Dentella perotifolia Willd. ex A. DC. in DC. Prodr. 7: 434. 1839.

Cephalostigma hirsutum Edgew. Trans. Linn. Soc. 20: 81. 1846; Hemsl. in Oliv. Fl. Trop. Afr. 3: 472. 1877.

Cephalostigma schimperi Hochst. ex A. Rich. Tent. Fl. Abyss. 2: 2. 1851.

Cephalostigma perotifolium (Wight & Arn.) Hutch. & Dalz. Fl. W. Trop. Afr. 2: 191. 1931.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 10 cm. high, flowers pale blue, 1100 m., June 17, 1946, *16342.** Widespread on the E. side of tropical Africa from the Anglo-Egyptian Sudan to S. Rhodesia; also in Nigeria and extending to India.

This plant presents both taxonomic and nomenclatural difficulty.

In India botanists have generally recognised two species, *C. hirsutum* Edgew. and *C. schimperi* Hochst. ex A. Rich. The main character used has been the seed-shape, conspicuously trigonous in *C. hirsutum,* compressed but not at all trigonous in *C. schimperi.* In addition there are some rather indefinite characters derived from the leaves and habit: leaves mostly oblong to lanceolate and sessile or nearly so in *C. schimperi,* broader and more narrowed towards the base in *C. hirsutum;* the habit of *C. hirsutum* is shorter, more bushy, more dichotomous and normally lacking the elongate central axis to the inflorescence found in *C. schimperi.* For a statement of the differences, see Haines, Bot. Bihar & Orissa 502 (1922). So far as India is concerned these characters are reasonably well correlated, but when we come to Africa the position appears much more perplexing; it is perfectly possible to find African specimens squaring with *C. hirsutum* and

C. schimperi as they have been interpreted in India, but in addition there are probably as many specimens which break down this correlation in a most uncooperative way. *Brass 16342* is one such, having the seeds not at all trigonous but a short bushy dichotomous habit. My own present inclination would be to treat the two seed-shapes as of subspecific importance, and for that reason I have taken the species in a wide sense here. But it is possible that the difficulty found in Africa is due to free crossing between two distinct species. Until this can be studied carefully in the field, I feel that the taxonomic course adopted here is at least not going to lead to more confusion than there may be already. This genus is certainly one to be commended to the attention of botanists in Africa.

Hutchinson and Dalziel in 1931 made the new combination *Cephalostigma perotifolium* and this has since been generally used. However there is no doubt that *Dentella erecta* Roth provides an earlier epithet, as was recognised long ago by Vatke. Indeed Wight and Arnott seem deliberately to have suppressed the epithet *erecta* in favour of their own, perhaps because they felt that Roth had made such a bad shot at placing the plant. Roth's description of the habit, the mention of subsessile lanceolate leaves, and the glabrous calyx-lobes suggest that his plant was what has been called *C. schimperi* and not *C. hirsutum*. If *C. hirsutum* were to be considered as a distinct species it would apparently keep its name.

Lightfootia abyssinica Hochst. ex A. Rich. Tent. Fl. Abyss. **2**: 1. 1851, sensu lato.

Kota-kota District: Chintembwe, in rocky grassland, perennial herb 50–70 cm. high, flowers yellow-green, 1400 m., Sept. 9, 1946, *17587*. Widespread from Abyssinia and the Anglo-Egyptian Sudan to S. Rhodesia and Angola.

This genus requires critical revision and the naming should therefore be accepted with some caution.

Lightfootia glomerata Engl. Bot. Jahrb. **19** (Beibl. 47): 52. 1894.

Lightfootia capitata Bak. Kew Bull. **1898**: 158. 1898.

Zomba District: Zomba Plateau, frequent in *Brachystegia* woodlands, herb up to 1 m. high, flowers pale blue, 1500 m., June 2, 1946, *16156*. Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 40–60 cm. high, with several to many stems ascending from a stout taproot to form a bushy crown, flowers blue, 1100 m., June 18, 1946, *16354*. North Nyasa District: Nyika Plateau, occasional in open grasslands, perennial herb 30–40 cm. high, flowers blue, 2250 m., Aug. 16, 1946, *17257**; ibid., Nchena-chena Spur, common in open grasslands, perennial herb 40–70 cm. high, rootstock fleshy, whitish, flowers blue, 2000 m., Aug. 20, 1946, *17348*. Tanganyika Territory, N. and S. Rhodesia, and Nyasaland.

For the present I consider that these capitate-flowered plants should be treated as one species, but this opinion must be taken with caution until field observations are available on how the inflorescence varies, e.g. whether there is a gradual passage from capitate to spicate.

Brass 16354 closely resembles the type of *L. capitata*, and like that seems to me to be a state in which the main stem has died or been decapitated, many lateral shoots having thus been encouraged to grow out. *Brass 17257* and *17348* appear to be the normally grown state of the same thing. It is perhaps worth noting that the calyx-lobes of *Brass 16354* are shorter (about 2 mm.) compared with those of the other two sheets (about 3–4.5 mm.). *Brass 17257* and *17348* are certainly what has been called *L. glomerata* Engl. var. *subspicata* Engl. Pflanzenw. Ost-Afr. C: 400 (1895), and also *L. densa* M. B. Scott, an unpublished name. *L.*

rupestris Engl. Bot. Jahrb. 30: 419 (1901), based on a plant collected by Goetze in SW. Tanganyika, is no doubt another synonym.

Wahlenbergia caledonica Sond. in Harv. & Sond. Fl. Cap. 3: 579. 1865; Brehm. Bot. Jahrb. 53: 105. 1915.

Zomba District: Zomba Plateau, on moist grassy slopes, apparently rare, perennial herb about 50 cm. high, branches several, ascending from a more or less fleshy sprout, flowers blue, 1450 m., June 5, 1946, *16260*. Nyasaland, for which this is the first record, and S. Rhodesia to S. Africa.

According to von Brehmer's revision of this genus, this would probably come under *W. dinteri* Brehm. Bot. Jahrb. 53: 106 (1915), which appears to be separated from *W. caledonica* Sond. only by habit. I do not consider this significant and therefore use the earlier name.

Brass 16260 is unusual in its characters, even when *W. caledonica* is taken in a wide sense, particularly in its strong hairiness, its relatively broad, undulate leaves, and its very small corollas. Although these characters can be found individually isolated in *W. caledonica*, it is possible that their combination may be sufficient to separate the Nyasaland plant, but as *Brass 16260* is the only specimen so far collected, it is still premature to do so.

Wahlenbergia virgata Engl. Pflanzenw. Ost-Afr. C: 400. 1895.

Mlanje District: Mlanje Mountain, west slopes, common on pathways in *Brachystegia* woodland, perennial herb 50 cm. high with many stems erect from a more or less fleshy stock, flowers pale purple, 1500 m., June 24, 1946, *16409*. North Nyasa District: Nyika Plateau, Nchena-chena Spur, in open grasslands, uncommon, herb, flowers pale purple, 1900 m., Aug. 20, 1946, *17351*. Anglo-Egyptian Sudan (Imatong Mountains) to South Africa.

Wahlenbergia madagascariensis A. DC. Monogr. Campan. 139. 1830; in DC. Prodr. 7: 429. 1839.

Wahlenbergia oppositifolia A. DC. in DC. Prodr. 7: 429. 1839; Brehm. Bot. Jahrb. 53: 134. 1915.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on edges of grassland paths, herb, prostrate and ascending, flowers white, 1870 m., June 27, 1946, *16486*. Madagascar and South Africa; now new to Nyasaland and tropical Africa.

ERICACEAE

Agauria salicifolia[40] (Comm. ex Lam.) Hook. f. ex Oliv. Fl. Trop. Afr. 3: 483. (1877) var. **pyrifolia** (Pers.) Oliv. Fl. Trop. Afr. 3: 483. 1877; Sleumer, Bot. Jahrb. 69: 387. 1938.

Andromeda pyrifolia Pers. Syn. Pl. 1: 481. 1805.

Zomba District: Zomba Plateau, one example seen in riparian rain-forest, tree 6–8 m. high, leaves dull green above, greyish beneath, flowers pale green, honey-scented, fruit not seen, 1680 m., May 31, 1946, *16103*. Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional on forest edges, tree 5–6 m. high, leaves greyish beneath, flowers reddish, 2140 m., June 27, 1946, *16464*; ibid., occasional in secondary forest and on edges of primary forest, tree up to about 8 m. high, leaves grey beneath, flowers green, 1890 m., July 8, 1946, *16734*; Chambe Plateau, common on edges of primary forest, tree up to 10 m. high and to 40 cm. in diameter at breast-height, leaves glaucous beneath, flowers green, 1900 m., July 9, 1946, *16765*. North Nyasa District: Nyika Plateau, common on forest edges—

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[40] *Andromeda salicifolia* Comm. ex Lam. Encyc. 1: 159. 1783.

one of the principal species in second-growth forest, tree 3–12 m. high, to 60 cm. in diameter, leaves concave, greyish beneath, petioles red, flowers greenish-yellow tinged with red, 2300 m., Aug. 14, 1946, *17220*. The range of the variety similar to that of the species—on the mountains of tropical Africa, Madagascar, Réunion, and Mauritius.

Erica milanjiana Bolus, Trans. S. Afr. Philos. Soc. **16**: 141. 1905; Alm & Fries, Ark. Bot. **21A**^{7}: 7. *pl. 16, f. 1c.* 1927.

Mlanje District: Mlanje Mountain, southwest ridge, under shelter of rocks on dry grassy slopes, shrub, plant viscid, of weak straggling habit, gregarious, branches 40–80 cm. long, corolla white, anthers brown, style, filaments and pedicel pinkish-red, 2400 m., June 28, 1946, *16511*. Endemic to Nyasaland.

Erica whyteana Britten, Trans. Linn. Soc. II. Bot. **4**: 24. *pl. 5, f. 7–12.* 1894; Alm & Fries, Ark. Bot. **21A**^{7}: 9. *f. 2a.* 1927.

Mlanje District: Mlanje Mountain, locally plentiful in association with *Sphagnum* on wet grassy slopes, shrub 30–60 cm. high, erect or weak and straggling in habit, flowers white, later pink, 2140 m., June 27, 1946, *16479*; Luchenya Plateau, on wet mossy ground on grassy slopes, shrub 10–20 cm. high, erect or ascending, 2100 m., June 27, 1946, *16481*; southwest ridge, common on moist grassy slopes, shrub 20–30 cm. high, flowers white, later pink, 2300 m., June 28, 1946, *16505*. Endemic to Nyasaland.

Erica johnstoniana Britten, Trans. Linn. Soc. II. Bot. **4**: 23. *pl. 5, f. 1–6.* 1894; Alm & Fries, Ark. Bot. **21A**^{7}: 20. *f. 5.* 1927.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common locally on shrubby forest borders, shrub 1–2 m. high, loosely branched, branches erect, calyx red, corolla pink, persistent, 1870 m., June 27, 1946, *16455*; southwest ridge, common in grass on summit, shrub 30–40 cm. high, flowers pink, 2400 m., June 28, 1946, *16524*; Luchenya Plateau, occasional in rocky grasslands, shrub 50 cm. high, flowers pink, 2200 m., July 11, 1946, *16794*. Nyasaland and S. Rhodesia.

Philippia benguelensis (Engl.) Welw. ex Britten, Trans. Linn. Soc. II. Bot. **4**: 24. 1894; Alm & Fries, Svensk. Vet.-Akad. Handl. III. **4**^{4}: 20. *pl. 2, f. 9f–g.* 1927; Norlindh & Weim. Bot. Notiser **1940**: 54. 1940.

Salaxis benguelensis Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:) 328. 1892.

Zomba District: Zomba Plateau, abundant on open edges of streams in rain-forest, tree 4–6 m. high, flowers pink, 1450–1800 m., May 31, 1946, *16126*. Mlanje District: Mlanje Mountain; Luchenya Plateau, plentiful in forest regrowths, shapely small tree of pyramidal habit, 4–6 m. high, much branched, flowers red, 2140 m., June 27, 1946, *16463*; southwest ridge, on and amongst rocks on open slopes, tree 3–4 m. high, habit compact, foliage pale green, flowers reddish, 2200 m., June 28, 1946, *16503*. North Nyasa District: Nyika Plateau, common on borders of montane forest and the chief species of second-growth communities, tree 3–6 m. high, flowers pink, fruit red, 2300 m., Aug. 16, 1946, *17251*. Mombera District: North Road, 20 miles N. of Mzimba, common in *Brachystegia* woodland, shrub 2–3 m. high, 1500 m., Aug. 22, 1946, *17388*. Uganda to S. Rhodesia and Angola.

Philippia nyassana Alm & Fries, Svensk. Vet.-Akad. Handl. III. **4**^{4}: 33. *f. 10.* 1927.

Mlanje District: Mlanje Mountain; Luchenya Plateau, abundant on forest edges and in neighbouring grasslands, shrub 1–3 m. high with branches erect and forming a shapely bush, or on taller plants drooping, flowers red, 1820 m., June 25, 1946, *16425*. Nyasaland and S. Rhodesia (see Norlindh & Weim. Bot. Notiser 1940: 58. 1940.

Ericinella brassii Brenan, sp. nov.

Proxima est ut videtur *E. microdontae* (C. H. Wright) Alm & Fries, ramulis dense et satis longe villoso-pubescentibus, foliis brevioribus magis appressis, corollis brevioribus cyathiformibus, praesertim stigmatibus latioribus facile distinguenda; aspectu cupressoide speciem austro-africanam *E. passerinoidem* Bolus accedens, ramulorum indumento, foliis multo manifestius ciliatis, pedicellis glabris vel pilis subplumosis plus minusve sparse vestitis raro sparse puberulis, corolla latiori cyathiformi longe recedit; a *E. multiflora* Klotzsch similiter differt sed praeterea foliis multo latioribus ovato-lanceolatis nec acicularibus distincta.

Frutex cupressoideus, 1–2 m. altus, ramosissimus. *Ramuli* foliiferi graciles, (0.3–) 0.5–1.2 (–2) mm. diametro, pilis patentibus inaequilongis albidis subplumosis crassiusculis diametrum ramuli saepe fere adaequantibus diu persistentibus dense villoso-pubescentes; ramuli seniores brunneo-purpurei, pannulis vel reticulo griseo irregulari epidermide efformato velati, tandem omnino purpureo-brunnei. *Folia* ternatim disposita, plerumque appressa, ovato-lanceolata, 1–2 (–3) mm. longa, 0.5–0.8 (–1) mm. lata, rigida, nitida usque nitidula, ad basim rotundata, ad apicem apiculato-acuta vel subacuta, costa supra prominula, subtus in sulco longitudinali conspicuo depressa, margine pilis albidis simplicibus necnon glandulis subsessilibus breviter sed sub lente conspicue ciliolata; petiolus applanatus, 0.25–0.5 mm. longus, 0.2–0.3 mm. latus, siccitate subtus luteolus, supra inferne luteolus superne aurantiacus. *Flores* in apice ramulorum (saepe lateralium ac brevissimorum) umbellato-capitati; pedicelli 2–7 aggregati, 1.5–2 mm. longi, arcuati, glabri vel pilis subplumosis sparse vestiti, raro pilis minimis puberuli. *Calyx* quadrilobatus, lobis conjunctis anguste oblongis superne incrassatis margine ciliolata, tribus circiter 0.7 mm. longis, uno majore et 1.15–1.5 mm. longo. *Corolla* alba, cyathiformis, glabra, 1.7–1.9 mm. longa, 1.5–1.7 mm. lata, lobis 4 late ovato-rotundatis 0.6–0.7 mm. longis, basi 0.8–0.9 mm. latis. *Stamina* 4, libera, filamentis 1 mm. longis, antheris 1 mm. longis rubris ad basim breviter caudatis, caudis 0.15–0.25 mm. longis ut videtur nonnunquam inaequalibus. *Ovarium* glabrum, quadriloculare, loculis pluriovulatis. *Stylus* circiter 1.7 mm. longus, glaber, superne in stigma 0.3–0.4 mm. latum sensim ampliatus.

Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional in shrubberies of forest edges, shrub 1–1.5 m. high, corolla white, anthers and stigma red, 1870 m., June 27, 1946, *16454* (TYPUS); Chambe Plateau, on brushy edges of primary forest, shrub 2 m. high, corolla white, anthers red, 2000 m., July 9, 1946, *16770*.

Only one species of *Ericinella, E. microdonta* (C. H. Wright) Alm & Fries, was hitherto known from tropical Africa, and that strangely enough also on Mlanje Mountain. *E. brassii* is, however, very distinct from *E. microdonta*, even in general facies, in which it perhaps more resembles *Philippia nyassana* Alm & Fries, but of course having the caudate anthers and narrowly obconical stigma characteristic of *Ericinella.* The indumentum on the branchlets of *E. brassii* is decidedly reminiscent of that of *Erica arborea* L.

Ericinella microdonta (C. H. Wright) Alm & Fries, Acta Horti Berg. 8: 262. 1925; Svensk. Vet.-Akad. Handl. III. 4^4: 46. *pl. 5, e.* 1927.

Blaeria microdonta C. H. Wright, Kew Bull. **1897**: 272. 1897.

Mlanje District: Mlanje Mountain; Luchenya Plateau, gregarious on rocky banks of streams subject to flooding, shrub about 1 m. high, flowers over, 1750 m., June 25, 1946, *16416*.

See the discussion under the following variety.

Ericinella microdonta (C. H. Wright) Alm & Fries var. **craspedotricha** Brenan, var. nov.

Folia margine glandulis sessilibus necnon pilis albidis anguste conicis regulariter dispositis breviter ciliata.

Mlanje District: 1915, *Mrs. Arthur Shinn s.n.* (Herb. Mus. Brit.). Mlanje Plateau, *J. McClounie 65* (Herb. Kew.). Mlanje Mountain, *Adamson 333, 376* (Herb. Kew.); Tuchila Plateau, shrub 1.2–1.8 m. high, flowers white, 1830 m., May 1900, *J. M. Purves 23* (Herb. Kew.); Luchenya Plateau, occasional in grassland edging rain-forest, attractive shrub 1–1.5 m. high, flowering profusely, corolla white, anthers and stigma red, 1860 m., June 26, 1946, *16446*; southwest ridge, plentiful among rocks on summit, tree or shrub 2–4 m. high, habit compact, gnarled, 2400 m., June 28, 1946, *16497* (TYPUS varietatis in Herb. Kew.); ibid., amongst rocks on grassy slopes, arborescent shrub 2–3 m. high, flowers white, 2200 m., June 28, 1946, *16502*; Luchenya Plateau, plentiful on grassy brink of an escarpment, shrub 1–2 m. high, corolla white, anthers and pedicels red, 1960 m., July 16, 1946, *16852*. Zomba District: Zomba, 1930, *J. B. Clements 102* (Herb. Kew.). North Nyasa District (?): South Nyika Mountains, 1220–1830 m., July 1896, *A. Whyte s.n.* (Herb. Kew.).

The various McClounie numbers—*55, 75, 95*—given by C. H. Wright with his original description of *Blaeria microdonta*, and all from Mlanje Mountain, are uniform and agree with *McClounie 40* and *Brass 16416* in having the leaves fringed along their margins only with minute regularly spaced sessile or subsessile glands. The specimens cited under var. *craspedotricha* likewise have these glands, but also, regularly spaced among them, short, whitish, narrowly conical, eglandular hairs, of course considerably longer than the glands. The leaves of var. *craspedotricha* are less regularly and neatly imbricate than those of the type. The type and the variety may perhaps inhabit different altitudes, but this requires further observation in Nyasaland. Alm and Fries (Svensk. Vet.-Akad. Handl. III. 4^4: 46, 47. 1927) did not distinguish from the type the new variety now described, but to me they appear well worth separation.

Blaeria kiwuënsis Engl. Bot. Jahrb. **43**: 346. 1909; Alm & Fries, Acta Horti Berg. **8**: 258. 1925.

Zomba District: Zomba Plateau, on edges of a path in open grasslands, shrub 20–50 cm. high, flowers pink, calyx viscid, 1700 m., May 31, 1946, *16139*. Mlanje District: Mlanje Mountain; Luchenya Plateau, locally common on hard soil in open grasslands, shrub about 15–40 cm. high, flowers pink, 2000 m., June 27, 1946, *16471*; ibid., common in open grasslands, shrub 40–50 cm. high, flowers pink, 2150 m., June 27, 1946, *16485*; southwest ridge, plentiful in grass on summit, shrub 35–50 cm. high, upper parts viscid, flowers pink, 2400 m., June 28, 1946, *16499*. North Nyasa District: Nyika Plateau, sporadic in open grasslands, shrub, greyish, flowers purplish-pink, 2350 m., Aug. 19, 1946, *17340*. Ruanda-Urundi, Tanganyika Territory, and Nyasaland.

Brass 17340 has the leaves almost eglandular, in this resembling *Stolz 1275* from southwestern Tanganyika; the other specimens have strongly glandular leaves. Alm and Fries (l.c.) discuss the variation in the glands of this species.

Blaeria patula (Engl.) Engl. Bot. Jahrb. **43**: 364. 1909; Alm & Fries, Acta Horti Berg. **8**: 260. 1925.

Blaeria spicata Hochst. ex A. Rich. var. *patula* Engl. Hochgebirgsfl. Trop. Afr. (Abh. Preuss. Akad. Wiss. Berl. **1891**:) 325. 1892.

North Nyasa District: Nyika Plateau, common locally in sheltered grasslands, abundant in young montane-forest regrowths, shrub 20–60 cm. high, brownish, flowers pale pink, 2340 m., Aug. 19, 1946, *17338*. Tanganyika Territory and Nyasaland; a variety on Mount Elgon in Uganda.

Blaeria patula (Engl.) Engl. var. **minima** Brenan, var. nov.

Habitu minimo valde insignis. Planta herbacea, florifera, ut videtur annua, erecta. Caulis simplex, 1.7–3 cm. altus, tenuis. Flores ex axillis in parte media et superiori caulis singulatim sed crebre exorientes. Pedicelli ebracteolati.

North Nyasa District: Nyika Plateau, between grass clumps in open grassland, 2–3 cm. high, corolla pink, fruit red, 2200 m., Aug. 17, 1946, *17291* (TYPUS varietatis in Herb. Kew.).

This is a plant of outstanding interest. The genus *Blaeria* hitherto has been considered only to include shrubs or shrublets, normally profusely branched and rather resembling *Calluna* in habit. Even the smallest of these previously known, *B. filago* Alm & Fries and a new species from Mount Kenya, although sometimes as little as 3–4 cm. high, are distinctly woody and have branches towards the base. *B. patula* var. *minima* is, however, quite simple, even smaller, and with slender stems, and at first sight looks most un-ericaceous; indeed in habit it resembles *Centunculus!*

Careful dissection shows that in spite of the oddity of its appearance, there is nothing significant to separate it from *B. patula* (Engl.) Engl. Interesting confirmation of this view is given by the sheet at Kew of *Stolz 1247* from southwestern Tanganyika; here are two plants, caespitosely branched at or towards their base, on one of which the central stems have normal *Blaeria* inflorescences, but two basal simple side shoots 3.5–4.5 cm. long bear one or two flowers arising singly from the axils after the fashion of var. *minima*. A similar arrangement is to be seen here and there on side branches of *Dummer 3503* at Kew, the type-number of *B. patula* (Engl.) Engl. var. *tenuis* (Alm & Fries) Alm & Fries.

What the real status is of var. *minima* is still doubtful—whether it is juvenile precocity inducing seedlings of the normal plant to flower in their first season's growth, or whether it is a race of genuine dwarfs. For the present I am making it a variety, though with an open mind about its ultimate destiny. Unfortunately such diminutive plants, surrounded by more spectacular growths to distract the glance, are likely to escape all but the keenest-eyed collectors. But now that attention has been drawn to it, I hope that botanists in Nyasaland will make a special effort to observe var. *minima* and find out what its real nature is. It is significant that Mr. Brass also collected typical *B. patula* on the Nyika Plateau.

Whatever its nature, var. *minima* suggests new and unexpected evolutionary possibilities for the *Ericaceae*.

Blaeria sp.

North Nyasa District: Nyika Plateau, occasional on grassland paths, shrub 10–20 cm. high, flowers pink, 2300 m., Aug. 14, 1946, *17231*.

Vegetatively very close indeed to *B. kiwuënsis* Engl., especially to *Brass 17340* cited under that species, but with larger corollas. More material is wanted.

VACCINIACEAE

Vaccinium exul Bolus, Hook. Ic. Pl. *pl. 1941* (1890) var. **africanum** (Britten) Brenan, comb. nov.

Vaccinium africanum Britten, Trans. Linn. Soc. II. Bot. 4: 23. 1894.

Mlanje District: Mlanje Mountain, southwest ridge, in elfin woods amongst rocks on summit, tree 3–4 m. high, fruits red, fleshy, 2400 m., June 28, 1946, *16526*; Luchenya Plateau, common on forest edges and in second-growth forest, shrub 2–3 m. high, generally sterile at this season, leaves more or less glaucous beneath, flowers white, 2100 m., July 9, 1946, *16751**; ibid., common on forest edges, tree or shrub 2–5 m. high, flowers white, or pink, 1890 m., July 13, 1946, *16816*. The variety in Nyasaland, the typical plant in the Transvaal.

Hutchinson (Bot. S. Afr. 351–353. 1946) sinks, rightly I believe, *V. africanum* Britten under *V. exul* Bolus, recognising, however, that the two differed in the clothing of the young branchlets. Sleumer (Bot. Jahrb. **71**: 416. 1941) fails to mention *V. exul*, but gives Nyasaland and the Transvaal as the area for *V. africanum*.

I agree with Hutchinson that there appears to be nothing except the indumentum to separate *V. exul* from *V. africanum*, and that this is not of specific significance. However the difference, such as it is, appears to be very constant, and I believe that *V. africanum* should be treated as a variant of *V. exul*. Comparative diagnoses may be helpful:

V. exul (typicum); ramuli juveniles, petioli et costae subtus manifeste et densiuscule pubescentes. Transvaal.

V. exul var. *africanum*; ramuli juveniles, petioli et costae glabri vel valde minute et inconspicue puberuli. Nyasaland.

MYRSINACEAE

Maesa lanceolata Forsk. Fl. Aegypt.-Arab. CVI, 66. 1775; Mez, Pflanzenreich 9(4^{236}): 26. 1902.

Zomba District: Zomba Plateau, frequent on rain-forest borders, tree 5–7 m. high, flowers greenish-white, 1450 m., June 3, 1946, *16179*. North Nyasa District: Nyika Plateau, occasional on edges of montane forest of escarpment, tree 6–8 m. high, fruit immature, 2200 m., Aug. 17, 1946, *17290*. Cholo District: Cholo Mountain, occasional in secondary rain-forest, tree 8–10 m. high, flowers white, native name (Chinyanja) ndiasongwe, 1200 m., Sept. 25, 1946, *17804*. Widespread in tropical Africa, extending to South Africa, Madagascar, and Arabia.

Maesa sp.

Mlanje District: Mlanje Mountain; Luchenya Plateau, common on forest-edges, tree to 10 m. high and 25 cm. in diameter, fruit green, 1890 m., July 6, 1946, *16699*.

Near *M. lanceolata* Forsk. but with larger fruits 5–6 mm. in diameter, as against 3–4 mm. (when dry). Further collection is desired.

Myrsine africana L. Sp. Pl. 196. 1753; Mez, Pflanzenreich 9 (4^{236}): 340. 1902.

Mlanje District: Mlanje Mountain, southwest ridge, in stunted forest in a gully, tree or shrub 3–4 m. high, branches slender, upright, fruit black when ripe, 2120 m., June 28, 1946, *16520*; Luchenya Plateau, common on forest borders, shrub 1–3 m. high, 1890 m., July 14, 1946, *16839*. North Nyasa District: Nyika Plateau, in second-growth forest, shrub 1.5 m. high, flowers red, 2340 m., Aug. 12, 1946, *17190*; ibid., common on edges of montane forest of escarpment, shrub 2–3 m. high, flowers green, anthers red, fruit reddish, 2100 m., Aug. 17, 1946, *17289*.

Rapanea melanophleos (L.) Mez, Pflanzenreich 9 (4^{236}): 375. 1902.
Sideroxylon melanophleos L. Mant. 48. 1767.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on edges of primary forest, tree about 6–8 m. high, flowers whitish, 1890 m., July 13, 1946, *16815*. Tanganyika Territory to South Africa.

An unusually small-leaved and slender-petioled form, apparently the same as *Stolz 2424* from SW. Tanganyika Territory, and *Wild 1430, 1461* from Inyanga, S. Rhodesia, all in Herb. Kew.

Embelia schimperi Vatke, Linnaea 40: 206. 1876; Mez, Pflanzenreich 9 (4^{236}): 329. 1902.

Embelia abyssinica Bak. in Oliv. Fl. Trop. Afr. 3: 497. 1877.
Embelia kilimandscharica Gilg, Bot. Jahrb. 20 (Beibl. 47): 45. 1894; Mez, Pflanzenreich 9 (4^{236}): 330. 1902; e descr.
Embelia nyassana Gilg, Bot. Jahrb. 30: 96. 1901; Mez, Pflanzenreich 9 (4^{236}): 329. 1902; e descr.

North Nyasa District: Nyika Plateau, large climber in montane forest, vine 6 m. high, leaves more or less fleshy, very dark green, nerves obscure, flowers yellowish-green, pedicels red, 2300 m., Aug. 13, 1946, *17203*. Abyssinia, southward to Nyasaland.

The characters used by Mez and Gilg to separate *E. schimperi*, *E. kilimandscharica*, and *E. nyassana* elude me. Specimens from southwestern Tanganyika have been distributed as *E. kagoje* and *E. stolzii*, both of them Gilg's unpublished names, which to me seem to be *E. schimperi*. I suspect that *E. mujenja* Gilg and *E. pellucida* (Hiern) K. Schum. may also prove to be synonymous.

SAPOTACEAE

Chrysophyllum gorungosanum Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 8: 44. 1904.

Chrysophyllum fulvum S. Moore, Jour. Linn. Soc. Bot. 40: 131. 1911.

Kota-kota District: Nchisi Mountain, common in primary rain-forest, tree attaining a large size, sap milky, fruit unripe, 1650 m., July 31, 1946, *17067*. Uganda to S. Rhodesia and Angola.

I am very grateful to Dr. A. D. J. Meeuse, of Pretoria, who is making a special study of the South African Sapotaceae, for informing me that *C. gorungosanum* is an earlier synonym of *C. fulvum*.

Chrysophyllum magalismontanum Sond. Linnaea 23: 72. 1850.

Chrysophyllum argyrophyllum Hiern, Cat. Afr. Pl. Welw. 3: 641. 1898; Engl. Monogr. Afr. Pfl.-Fam. & Gatt. 8: 46. 1904.

Kota-kota District: Chia area, common on banks of waterholes on dry lake plain, tree to 15 m. tall and 40 cm. in diameter, leaves brownish below, flowers red, sap milky, native name (Chinyanja) mpapa, 480 m., Sept. 5, 1946, *17539*. Belgian Congo, N. Rhodesia, Angola, and South Africa; no specimens from Nyasaland hitherto in Herb. Kew., but recorded for Nyasaland in Check-Lists For. Trees & Shrubs Brit. Emp. 2 (Nyasaland): 70 (1936).

Dr. A. D. J. Meeuse kindly informs me that he cannot distinguish *C. argyrophyllum* from *C. magalismontanum*.

Vincentella sapini (De Wild.) Brenan, comb. nov.

Bakerisideroxylon sapini De Wild. Rev. Zool. Afr. 7 (Suppl. Bot.): B 16. 1919.
Pouteria tridentata Baehni, Candollea 9: 386. 1942.
Vincentella stolzii Mildbr. ex Hutch. Bot. S. Afr. 506. 1946, nomen nudum.

Kota-kota District: Chia area, on bank of a stream in woodland of lake plain, tree 6 m. high, sap milky, fruit yellow, soft, edible, native name (Chinyanja) pimbinyolo, 480 m., Sept. 3, 1946, *17510*. Belgian Congo, Portuguese East Africa, Nyasaland (new record), and N. Rhodesia.

Baehni (Candollea 9: 385. 1942) makes *Bakerisideroxylon sapini*, from the description, a probable synonym of *Pouteria revoluta* (Bak.) Baehni. Part of the type-gathering of the former, agreeing with the original description, is at Kew, and shows that this is wrong, the two plants differing widely in branchlet indumentum, stipules, leaf-apex, etc. *B. sapini* is in fact much closer to the plant that Baehni described as *Pouteria tridentata* Baehni, based on *Stolz 1889* from southwestern Tanganyika Territory; indeed I am certainly not prepared to separate them specifically. The only difference is that the ultimate venation of the leaves of *Pouteria tridentata* is more impressed and hence more conspicuous; at present I am not willing to admit that alone as a reason for separation.

In rejecting Baehni's wholesale amalgamation of African sapotaceous genera under *Pouteria* Aubl., I recognise that the delimitation of genera in this family is often fiendishly difficult and very much a matter of opinion. But at the same time I remain unconvinced that the proposed fusion is going to clear the air and make identification easier.

Mimusops sp.

Mlanje District: Likubula Gorge, in riparian rain-forest, shapely dark-foliaged tree 8 m. high, sap milky, fruit unripe, 840 m., June 20, 1946, *16366.*

Flowering material is wanted for certain identification.

EBENACEAE

Royena macrocalyx Gürke in Engl. Pflanzenw. Ost-Afr. C: 305. 1895; B. L. Burtt, Kew Bull. **1935:** 286, 287. 1935.

Chikwawa District: Chikwawa, common locally in *Acacia albida* woodland, tree or shrub 4–6 m. high, deciduous, young leaves only, flowers green, fruit 20–25 mm. in diameter, globose or depressed-globose, orange, edible, 200 m., Oct. 3, 1946, *17915.* Kenya, Tanganyika Territory, Nyasaland, and Portuguese East Africa.

Royena sericea Bernh. Flora **27:** 824. 1844.

Mlanje District: Mlanje, on a termite mound in *Brachystegia* woodland, tree or shrub 4–5 m. high, flowers yellowish, 750 m., Sept. 30, 1946, *17882.* N. Rhodesia and Nyasaland to South Africa.

Royena lucida L. Sp. Pl. 397 (1753) var. **whyteana** (Hiern) De Winter & Brenan, stat. nov.

Royena whyteana Hiern, Trans. Linn. Soc. II. Bot. **4:** 25. 1894.
Royena goetzei Gürke, Bot. Jahrb. **30:** 372. 1901.
Royena nyassae Gürke, Bot. Jahrb. **30:** 373. 1901.

Zomba District: Zomba Plateau, in riparian rain-forest, tree 4–6 m. high, fruit and inflated calyx green, 1680 m., May 31, 1946, *16101.* Mlanje District: Mlanje Mountain; Luchenya Plateau, occasional on edges of primary forest patches, tree about 10 m. high and about 25 cm. in diameter, leaves glossy above, dull beneath, fruiting calyx green, fruit soft, purple, 1890 m., July 2, 1946, *16623.* Kota-kota District: Nchisi Mountain, occasional on edges of rain-forest, tree 5–8 m. high, compact and shapely, fruiting calyx green or reddish, ripe fruit blackish-purple, soft and fleshy, 1650 m., July 31, 1946, *17055.* North Nyasa District: Nyika Plateau, on edge of montane forest, tree 5 m. high, fruiting calyx green, fruit immature, 2250 m., Aug. 16, 1946, *17252.* The variety in Tanganyika Territory, Nyasaland, and S. Rhodesia; the species extending to South Africa.

R. whyteana, or, as it has been more usually named, *R. nyassae*, has been hitherto accepted as a species distinct from *R. lucida.* The only distinction between the South African *R. lucida* and the tropical *R. whyteana* seems to be shortly triangular sepals of the former contrasted with the elongate-triangular sepals of the latter. This, although a small point, is readily observed. We therefore feel that *R. whyteana* should be treated as a variety of *R. lucida*, and the necessary transfer is made above.

Diospyros kirkii Hiern, Trans. Cambr. Philos. Soc. **12:** 199. 1873.

Chikwawa District: Chikwawa, common in *Combretum-Sterculia* woodlands on stony ridges, tree 6–8 m. high, fruit soft, orange-coloured, eaten by natives, native

name (Chinyanja) mchengi, 300 m., Oct. 5, 1946, *17994*. Tanganyika Territory, Nyasaland, N. and S. Rhodesia, Portuguese East Africa, and Angola.

Diospyros [§ **Maba** (J. R. & G. Forst.) Bakh.] **nyasae** Brenan, sp. nov.

Affinis est *D. natalensi* (Harv.) Brenan[41] et *D. dawei* (Hutch.) Brenan, foliis majoribus lanceolatis apicem et basim versus magis attenuatis, petiolis plerumque longioribus, ramulis juvenilibus etsi pilos longiores praebentibus tamen puberulentiam minutam omnino carentibus; praeterea a *D. dawei* inflorescentiis ♂ unifloris subsessilibus nec 2–3-floris pedunculis pedicellisque distinctis valde praecipue distat (inflorescentiae ♂ *D. natalensis* etiamnunc incognitae sunt); necnon calycibus et corollis ♂ paulo majoribus differt.

Frutex vel arbor parva 2–3 m. alta, sempervirens, ut videtur dioica, ramis horizontaliter patentibus. *Rami* crebre ramosi; ramuli juniores glabri vel pilis perpaucis longiusculis diametrum ramuli fere adaequantibus, graciles, 0.5–1.5 mm. diametro; seniores glaberrimi, cortice griseo vel griseo-brunneo obtecti; internodia brevia, 2–9 mm. longa. *Folia* inter generis minora, (2–) 3–4.5 (–5) cm. longa, 0.7–1.3 cm. lata, lanceolata, circa medium latissima, subcoriacea vel coriacea, apicem obtusum et basim cuneato-acutum versus utrinque aequabiliter angustata, glabra, siccitate brunnea, utrinque opaca vix nitidula, costa utrinque prominula, nervis lateralibus primariis utroque costae latere circiter 6–8 sed a secundariis aegre discernendis rete venularum conjunctis omnibus tenuibus supra inconspicuis vel prominulis subtus prominulis; petiolus 2–4 mm. longus basi articulatus, sub lente minutissime puberulus. *Alabastra inflorescentiarum* ♂ et ♀ ovoidea vel elliptica, 2–4.5 mm. longa, squamis circiter 8 distichis arcte imbricatis rigidis usque ad 4.5 mm. longis et 3.5 mm. latis (explicatis) margine albido-ciliolatis extra plus minusve appresse pubescentibus composita. *Inflorescentiae* ♂ et ♀ axillares, ut videtur semper uniflorae; pedunculi (pedicelli inclusi) brevissimi, circiter 2 mm. longi, pubescentes, cicatricibus squamarum delapsarum vel nonnunquam squamis nonnullis persistentibus notati. *Flores* ♂: *Calyx* cupularis vel campanulatus, 3–4.5 mm. longus et ad apicem circiter 4.5 mm. latus, prope basim sparse et appresse pubescens, aliter margine truncato vel breviter et irregulariter trilobato albido-ciliolato excepto glaber, ad basim sulco annulari conspicue articulatus; lobi circiter 1.5 mm. alti, ad basim circiter 3 mm. lati. *Corolla* extra (parte basali tubi 1.5 mm. longo glabro excepto) ubique dense et appresse sericea, tubo campanulato 3.5–4 mm. longo apice circiter 3 mm. diametro; lobi 3–4, rotundati, 2.5 mm. longi et lati, intus glabri. Stamina 10–15; filamenta brevissima, 0.1 mm. longa, glabra, basi corollae tubi inserta; antherae lineari-oblongae, 2.5–3 mm. longae, glabrae. *Ovarium* nullum. *Flores* ♀: *Calyx* anthesi 4 mm. longus, margine truncato vel brevissime trilobato, aliter ut in mare; in statu fructifero accrescens, late cupulatus, 4 mm. longus, 6 mm. latus, basim fructus arcte amplectens. *Corolla* extra more maris vestita, parte glabro 1 mm. longo, tubo circiter 3 mm. longo apice circiter 3 mm. diametro; lobi 3, circiter 3 mm. lati, aliter ut in mare. *Staminodia* 9, circiter 1 mm. longa, ad basim corollae tubi inserta. *Ovarium* conico-hemisphericum, circiter 1 mm. altum, 2 mm. latum, glabrum, triloculare, loculis biovulatis. *Stylus* parte inferiore connato 1.5 mm. longo, superne trifurcatus, ramis 1 mm. longis. *Fructus* ellipsoideus, 8–10 mm. longus, 5–6 mm. latus, styli basi persistenti apiculatus, monospermus, pericarpio laevi tenui sed rigido. *Semen* (unicum ? immaturum tantum visum) plus minusve

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[41] **Diospyros natalensis** (Harv.) Brenan, comb. nov.

Maba natalensis Harv. Thes. Cap. **2**: 7. *pl. 110.* 1863; Hiern, Trans. Cambr. Philos. Soc. **12**: 131. 1873; Hiern in Thiselton-Dyer, Fl. Cap. **4**^{1}: 476. 1906.

ellipsoideum, 6 mm. longum, 3.5 mm. latum, nigrescens, ut videtur unilateraliter sulcatum necnon etiam linea angustissima circumcinctum.

Nyasaland, without more precise locality, 1891, *J. Buchanan 975* (TYPUS in Herb. Kew, ♂ and ♀ flowers and fruits), 977 (Herb. Kew., ♂ buds and flowers). Mlanje District: Likubula Gorge, common on floodswept rocky banks of river, tree or shrub 2–3 m. high, branches horizontal, fruit orange-yellow, 840 m., June 20, 1946, *16385*.

This new species is a member of a small group including *D. natalensis, D. dawei*, and *D. nummularia* Brenan, which would formerly have been all put under *Maba*; of these *D. natalensis* is apparently the nearest relative.

D. nyasae is distinct from the other three by its leaf-shape alone, which seems unusually constant in these species: the lanceolate leaves of *D. nyasae* contrasting with the elliptic leaves of *D. natalensis* and *D. dawei* and the ovate to orbicular leaves of *D. nummularia*. In addition the indumentum of the young branchlets is important: *D. natalensis, D. dawei*, and *D. nummularia* have a very short patent puberulence among which longer usually ascending bristly hairs may or may not be mixed; the longer bristly hairs are or are not present in *D. nyasae* but the "understory" of puberulence is absent on all the specimens I have seen.

D. nyasae is also remarkable in that its ♂ inflorescences are reduced to a single subsessile or very shortly stalked flower; in *D. nummularia* and *D. dawei* the ♂ inflorescences are 2–4-flowered. Unfortunately the ♂ inflorescence of *D. natalensis* has yet to be collected and described.

OLEACEAE

Jasminum fluminense Vell. Fl. Flum. 10. 1825; Atl. **1**: *pl. 23.* 1827; Dandy, Kew Bull. **1950**: 368. 1950; Turrill, Fl. Trop. E. Afr. Oleac. 19. 1952.

Jasminum mauritianum Boj. ex DC. Prodr. **8**: 310. 1844; Gilg & Schellenb. Bot. Jahrb. **51**: 88. 1913.

Kasungu District: Kasungu, on banks of stream in *Brachystegia* woodland, subscandent shrub 2 m. high, flowers white, ripe fruits 8 mm. in diameter, black, globose, 1000 m., Aug. 24, 1946, *17406*. Chikwawa District: Lower Mwanza River, occasional on sandy riverbanks, fruits 8–10 m. in diameter, globose, black, 180 m., Oct. 6, 1946, *18008*. Widespread in tropical Africa, rare in the west, extending S. to the Transvaal; also in Mauritius and the Seychelles; introduced into the New World.

Schrebera sp.

Kota-kota District: Nchisi Mountain, occasional in rain-forest of gullies, tree 12–15 m. high, fruit dry, dehiscent, 1400 m., Aug. 2, 1946, *17109*.

This seems near to *S. goetzeana* Gilg, Bot. Jahrb. **28**: 450. pl. 8 (1900); **30**: 70, 72 (1901); Lingelsheim, Pflanzenreich **72** (4^{243}): 102 (1920); which, however, has a non-alate rhachis to the leaves; and near also to *S. mazoënsis* S. Moore, Jour. Bot. **45**: 48 (1907); Lingelsheim, Pflanzenreich **72** (4^{243}): 107 (1920); which is pubescent not glabrous. The taxonomy in this genus is difficult, and further ample and carefully selected material is wanted so that we can work out how wide a variation exists under the various species.

Dekindtia africana Gilg, Bot. Jahrb. **32**: 193. 1902; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 588. 1904; Turrill, Fl. Trop. E. Afr. Oleac. 16. 1952.

Kota-kota District: Nchisi Mountain, in rain-forest of gullies, tree 10 m. high, fruit unripe, 1400 m., July 25, 1946, *16938*. Kenya, Tanganyika Territory, Nyasaland, S. Rhodesia, and Angola.

SALVADORACEAE

Azima tetracantha Lam. Encyc. **1**: 343. 1783; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 22. 1902.

Chikwawa District: Chikwawa, plentiful in dry brushy forest of elevated river plain, scandent shrub 3–8 m. high, branches thorny, flowers green, 200 m., Oct. 2, 1946, *17892*. Extending down eastern Africa from Somaliland to the Cape, and there is a specimen in the Kew Herbarium from the "Lower Congo"; outside Africa it goes through Arabia to India and (if *A. sarmentosa* Benth. is not excluded) to the Philippines.

APOCYNACEAE

Landolphia buchanani (Hall. f.) Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 35. 1902.

Clitandra buchanani Hall. f. Jahrb. Hamb. Wiss. Anstalt **17** (3 Beih.): 118. 1899.

Kota-kota District: Nchisi Mountain, on rocks in *Brachystegia* woodland, shrub 2 m. high, subscandent, tendrillate, sap milky, flower-buds only, fruit hard, globose, about 3.5–4.5 cm. in diameter, 1500 m., July 26, 1946, *16965*. Tanganyika Territory, Portuguese East Africa, Nyasaland, and N. and S. Rhodesia.

L. buchanani, without flowers, is difficult to separate from *L. cameronis* Stapf, and there is thus a little doubt about this determination.

Landolphia kirkii Dyer, Kew Report **1880**: 39, 42. 1881; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 55. 1902; Dyer, Hook. Ic. Pl. *pl. 2755*. 1903.

Kota-kota District: Chia area, plentiful in bushy forest on banks of waterholes, subscandent shrub 3–6 m. high, sap milky, fruits 3–4 cm. in diameter, globose, greenish-grey marked with brown, native name (Chinyanja) mpila, 480 m., Sept. 5, 1946, *17535*. Kenya and Tanganyika Territory, southward to the Transvaal.

Carissa bispinosa (L.) Desf. Tabl. École Bot. 78. 1804.

Arduinia bispinosa L. Mant. 52. 1767.

Carissa arduina Lam. Encyc. **1**: 555. 1785; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 91. 1902.

Zomba District: Zomba Plateau, one example in rain-forest undergrowth, shrub 1–2 m. high, sap milky, flowers not seen, fruit unripe, 1450 m., June 3, 1946, *16182*. Portuguese East Africa, Nyasaland, and S. Rhodesia to South Africa.

Rauvolfia caffra Sond. Linnaea **23**: 77. 1850; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 110. 1902.

Rauvolfia natalensis Sond. Linnaea **23**: 78. 1850; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 111. 1902.

Rauvolfia ochrosioides K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 318. 1895; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 111. 1902.

Kota-kota District: Nchisi Mountain, frequent in rain-forest, tree up to about 25 m. high and about 50 cm. in diameter at breast-height, sap milky, flowers white, fragrant, 1500 m., Sept. 11, 1946, *17617*. Cholo District: Cholo Mountain, frequent in rain-forest, tree up to 25 m. high, sap milky, flowers white (buds only), 1200 m., Sept. 24, 1946, *17773*. Uganda to South Africa, extending westward into the Belgian Congo.

Phillips (Jour. S. Afr. Bot. **12**: 111. 1946) has shown that *R. natalensis* Sond. cannot be kept up as a species distinct from *R. caffra* Sond. One shoot of the Kew duplicate of *Brass 17773* shows small leaves and congested inflorescences, suggesting *R. ochrosioides* K. Schum, but the numberless transitions between this and *R. natalensis* make me consider it as nothing more than a state, and dissection of the type-numbers of *R. ochrosioides* and *R. caffra* shows no floral differences between them. I therefore sink *R. ochrosioides* into synonymy under *R. caffra.*

Diplorhynchus condylocarpon (Muell. Arg.) Pichon, Bull. Mus. Nat. Hist. Nat. II. **19**: 368. 1947.

Aspidosperma condylocarpon Muell. Arg. in Mart. Fl. Bras. **6^1**: 55. 1860.
Diplorhynchus mossambicensis Benth. Hook. Ic. Pl. *pl. 1355.* 1881; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 107. 1902.

Kasungu District: Kasungu, common in *Brachystegia* woodlands, tree 7-12 m. high, 10-30 cm. in diameter, sap milky, native name tombozi, 1000 m., Aug. 25, 1946, *17414.* Chikwawa District: Chikwawa, frequent in woodland of dry stony ridge, tree 6-8 m. high, flowers cream-coloured, native name (Chinyanja) tombozi, 200 m., Oct. 5, 1946, *17987.* Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, Angola, Bechuanaland, and the Transvaal.

Duvigneaud, Marlier and Dewit (Bull. Soc. Roy. Bot. Belg. **84**: 266. 1952) refer *Brass 17987* to *D. condylocarpon* subsp. *mossambicensis* (Benth.) Duvign. var. *psilopus* (Welw.) Duvign. *Brass 17414* would, according to their key, also come under this subspecies. For the characters of these plants reference should be made to the above-cited paper, which is an instructive, scientifically valuable, and altogether exemplary attempt to portray the great variability of a widespread savannah species in tropical Africa.

Conopharyngia sp.

Kota-kota District: Nchisi Mountain, in primary rain-forest, tree 15 m. high and 25 cm. in diameter at breast-height, dried fruits separate, fruits globose, 14 cm. in diameter, base depressed, 1500 m., Sept. 11, 1946, *17616.*

This is no doubt either *C. holstii* (K. Schum.) Stapf in Thiselton-Dyer, Fl. Trop Afr. **4^1**: 146 (1902) (*Tabernaemontana holstii* K. Schum. in Engl. Pflanzenw. Ost-Afr. C: 317. 1895), or else *C. johnstonii* Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 147 (1902); but Mr. Brass' specimen lacks the flowers that are necessary for separating these two species with certainty. Only *C. johnstonii* has been previously recorded from Nyasaland.

Conopharyngia elegans (Stapf) Stapf, in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 149. 1902.

Tabernaemontana elegans Stapf, Kew Bull. **1894**: 24. 1894.

Chikwawa District: Lower Mwanza River, sporadic in dry brushy forest, tree 8 m. high, fruits warty, green, seeds orange, native name (Chinyanja) chikopi, 180 m., Oct. 4, 1946, *17943*; ibid., occasional on sandy river banks, tree 6-8 m. high, flowers white, fragrant, = *17943*, native name (Chinyanja) chikopi, 180 m., Oct. 6, 1946, *18015.* Kenya, Portuguese East Africa, Nyasaland, and S. Rhodesia.

Schizozygia coffaeoides Baill. Bull. Soc. Linn. Paris **1**: 752. 1888; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 135. 1904.

Kota-kota District: Chia area, frequent in rain-forest regrowths on banks of streams, shrub 1-2 m. high, flowers yellow, seeds orange-red, 480 m., Sept. 4, 1946, *17524.* Kenya, Tanganyika Territory, Zanzibar, and Pemba; new to Nyasaland.

Mascarenhasia variegata Britten & Rendle, Trans. Linn. Soc. II. Bot. **4**: 26. *pl. 6, f. 1-3.* 1894; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 193. 1902.

Lanugia variegata (Britten & Rendle) N. E. Br. Torreya **27**: 53. 1927.

Mlanje District: Likubula Gorge, on rocky edges of river, subject to flooding, tree or shrub 2-3 m. high, branches more or less horizontal, sap milky, 840 m., June 20, 1946, *16369*. Kenya, Tanganyika Territory, Zanzibar, Portuguese East Africa and Nyasaland.

The characters used by N. E. Brown (l.c. p. 52) to separate his new genus *Lanugia* from *Mascarenhasia*—"smaller flowers with shorter tubes and the corolla pubescent on the inner surface, by the glands of the disk being free, the stouter, teretely linear-lanceolate and somewhat woody pods (which in *Mascarenhasia* are slender linear-terete and more or less nodose but not woody) and by the more numerous seeds"—to me seem specific rather than generic, with the exception of the free glands.

I have examined various flowers from different gatherings of *Mascarenhasia variegata* and I find the disc-glands neither constant nor as described by Brown. The most frequent arrangement is three free glands accompanied by a fourth connate pair [1 + 1 + 1 + (2)], but on the same specimens flowers may be found showing one free gland with two connate pairs [1 + (2) + (2)]. The arrangement mentioned by Brown (1 + 1 + 1 + 1 + 1) I have not actually found myself, but the evident inconstancy of the glands makes it far from improbable. Now De Candolle described *Mascarenhasia* as having one free gland together with either two pairs or one quadruple gland [1 + (2) + (2) or 1 + (4)]. In *M. lisianthiflora* A.DC. I have found 1 + (2) + (2) and also (2) + (3) in different flowers on the same shoot. It will be seen that 1 + (2) + (2) occurs in both *Lanugia* and *Mascarenhasia*, and thus I feel that it is quite impossible to separate *Lanugia* from *Mascarenhasia* on the gland structure.

Pichon, Rev. Bot. Appl. **29**: 24 (1949), sinks *Mascarenhasia variegata*, with a swarm of other binomials, under *M. arborescens* A. DC. in DC. Prodr. **8**: 488 (1844), a species from Madagascar of which we have no named material at Kew. It is obvious that plants very closely related indeed to *M. variegata* occur in Madagascar, and Pichon may well be right, but I feel it wiser to await other opinions before introducing this unfamiliar name for the continental African species; especially as *M. micrantha* Baker from Madagascar, of which we have a number of specimens and which Pichon also includes under *M. arborescens*, is separable by leaf-characters from *M. variegata* (see N. E. Brown, Torreya **27**: 52, 53. 1927).

Adenium multiflorum Klotzsch in Peters, Reise Mossamb. Bot. 279. *pl. 44*. 1861; Stapf in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 229. 1902.

Kota-kota District: Kota-kota, cultivated, shrub 0.9–1.2 m. high, flowers pale pink, margins of lobes darker pink, 460 m., Aug. 7, 1946, *Shortridge 17389*. Nyasaland and Portuguese East Africa to Natal.

ASCLEPIADACEAE

Raphionacme jurensis N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 272. 1902.

Chikwawa District: Chikwawa, sporadic in dry stony woodland, perennial herb 15–20 cm. high, leafless shoots flowering on burnt ground, flowers greenish-white, 200 m., Oct. 5, 1946, *17985*.* Anglo-Egyptian Sudan, Tanganyika Territory, Nyasaland (for which this is the first record), and Portuguese East Africa.

Glossostelma spathulatum (K. Schum.) Bullock, Kew Bull. **1952**: 414. 1952.

Schizoglossum spathulatum K. Schum. Bot. Jahrb. **17**: 120. 1893.
Xysmalobium bellum N. E. Br. Kew Bull. **1895**: 69. 1895; in Thiselton-Dyer, Fl. Trop. Afr. **4^1**: 311. 1902.

Blantyre District: Blantyre, in *Brachystegia* woodlands, herb 30–40 cm. high, 1100 m., June 17, 1946, *16351*. Belgian Congo, Tanganyika Territory, Portuguese East Africa, Nyasaland, N. and S. Rhodesia, and Angola.

For a discussion of *Glossostelma* and for further synonymy of *G. spathulatum* see Bullock (l.c.).

Calotropis procera (Ait.) Ait. f. Hort. Kew. ed. 2. 2: 78. 1811; N. E. Br. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 294. 1902.

Asclepias procera Ait. Hort. Kew. **1**: 305. 1789; Willd. Sp. Pl. **1**: 1263. 1798.

Chikwawa District: Chikwawa, common on open alluvial plains, shrub 2–3 m. high, fleshy, grey-green, branches erect, flowers purple, fruit usually inflated, 200 m., Oct. 2, 1946, *17908*. Widespread in the northern half of tropical Africa, extending southward to Nyasaland, and though Egypt and Arabia to India; also, no doubt introduced, in the West Indies and Central and South America.

Woodson (Ann. Missouri Bot. Gard. **17**: 48. 1930) made the new combination *Calotropis syriaca* (S. G. Gmel.) Woodson (*Apocynum syriacum* S. G. Gmel. Reise Russ. **2**: 198, 257. 1774), alleging this to be the right name for *Calotropis procera*. Incautiously, I followed Woodson in adopting *C. syriaca* in Check-Lists For. Trees & Shrubs Brit. Emp. **5** (Tanganyika Territory Part 2): 64 (1949). Mr. J. E. Dandy of the British Museum (Natural History) has kindly looked at the German edition of Gmelin's *Reise*, which is not at Kew, and informs me that *Apocynum syriacum* S. G. Gmel. is a *nomen nudum*. I suspect that Woodson made *Apocynum syriacum* a *Calotropis* on the strength of its inexplicable reduction in the *Index Kewensis*. What Jackson's evidence for this was I do not know. It is possible, though there is no direct evidence for it, that Gmelin intended to refer to *Apocynum syriacum* Clus. Rar. Pl. Hist. **5**: lxxxii (1601). Clusius' plate certainly points to *Calotropis*, and Boissier agrees that it is *C. procera*. Linnaeus (Sp. Pl. 214. 1753) wrongly referred Clusius' plant to an American species of *Asclepias*, *A. syriaca* L.

The name *Calotropis procera* should, pending further evidence, stand.

Pergularia barbata (Klotzsch) N. E. Br. ex Brenan, comb. nov.

Daemia barbata Klotzsch in Peters, Reise Mossamb. Bot. 274. 1861; N. E. Brown in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 388. 1903.

Chikwawa District: Lower Mwanza River, trailing on a sandy beach, vine, flowers greenish-white, 180 m., Oct. 6, 1946, *18019*. Portuguese East Africa and Nyasaland.

Ceropegia sp.

Zomba District: Zomba, trailing in pine plantations, flowers blackish-purple, 1200 m., May 26, 1946, *Mrs. C. W. Benson 16033A*.*

This seems near *C. leucotaenia* K. Schum. Bot. Jahrb. **17**: 151 (1893), which my colleague Mr. A. A. Bullock kindly tells me is a synonym of *C. abyssinica* Decne. in DC. Prodr. **8**: 644 (1844) (see Bullock, Kew Bull. **1952**: 424. 1952); but the lobes of the corolla in *16033* are considerably longer in relation to the tube. The specimen however is a meagre one, and more and better material, with flowers in alcohol, is wanted.

LOGANIACEAE

Lachnopylis cf. **polyantha** (Gilg) C. A. Sm. Kew Bull. **1930**: 18. 1930.

Nuxia polyantha Gilg, Bot. Jahrb. **30**: 376. 1901; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 513. 1903.

North Nyasa District: Nyika Plateau, edges of montane forest of escarpment, tree 5–6 m. high, flowers cream, fruit last season's, 2200 m., Aug. 17, 1946, *17295*.

Probably correct, but better specimens are wanted for certain determination. *L. polyantha* has been previously known only from Tanganyika Territory.

Lachnopylis oppositifolia Hochst. Flora **26**: 77. 1843; C. A. Sm. Kew Bull. **1930**: 24. 1930.

Nuxia dentata R. Br. ex Benth. in DC. Prodr. **10**: 435. 1846; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 513. 1903.

Cholo District: Nswadzi River, on river flood-banks, tree 4–6 m. high, flowers white, native name (Chinyanja) Nsambi, 840 m., Sept. 27, 1946, *17850*. Widespread in the eastern side of tropical Africa, extending south to Natal and Zululand.

Lachnopylis cf. **goetzeana** (Gilg) Greenw. ex Burtt Davy, Check-Lists For. Trees & Shrubs Brit. Emp. **5**^{1}: (Tanganyika Terr.): 112. 1940.

Nuxia goetzeana Gilg, Bot. Jahrb. **30**: 375. 1901; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 514. 1903.

Mlanje District: Mlanje Mountain; Luchenya Plateau, frequent on edges of primary forest, tree up to 10 m. high, leaves smooth, shining, somewhat convex, flowers white, 1890 m., July 8, 1946, *16733*.

L. goetzeana has been recorded before only from Tanganyika Territory, and if this determination is correct will be new to Nyasaland; but the genus requires revision, and the determination must be accordingly taken only with a good deal of caution. Further, it must be decided whether *L. goetzeana* is a southern variant of *L. congesta* (R. Br. ex Fresen.) C. A. Sm. or a distinct species. Some material of *L. congesta* will no doubt come here, but accurate and final naming is at present scarcely possible.

Lachnopylis sambesina (Gilg) C. A. Sm. Kew Bull. **1930**: 17. 1930.

Nuxia sambesina Gilg in Engl. Pflanzenw. Ost-Afr. C: 312. 1895; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 514. 1903.

Zomba District: Zomba Plateau, several trees in a relic clump of rain-forest, tree 8 m. high and 30 cm. in diameter at breast-height, leaves pale brownish-floccose beneath, convex, flower-buds only, 1820 m., May 31, 1946, *16143*. Nyasaland and S. Rhodesia (and ? Tanganyika Territory).

Lachnopylis viscosa (Gibbs) C. A. Sm. Kew Bull. **1930**: 17. 1930.

Nuxia viscosa Gibbs, Jour. Linn. Soc. Bot. **37**: 454. 1906.

Kota-kota District: Nchisi Mountain, plentiful in rain-forest, tree to 20 m. high and 50–60 cm. in diameter, trunk deeply fluted, in bud only, 1650 m., July 30, 1946, *17061*; ibid., frequent in rain-forest, tree up to about 25 m. high and up to about 50 cm. in diameter at breast-height, flowers white, 1500 m., Sept. 11, 1946, *17618*. S. (and ? N.) Rhodesia; now new to Nyasaland.

Buddleja salviifolia (L.) Lam. Encyc. **1**: 513. 1785; Bak. in Thiselton-Dyer, Fl. Trop. Afr. **4**^{1}: 516. 1903; Marquand, Kew Bull. **1930**: 198. 1930.

Lantana salviifolia ("salvifolia") L. Syst. Nat. ed. 10. **2**: 1116. 1759.

Mlanje District: Mlanje Mountain; Luchenya Plateau, amongst rocks in grassland, not common, shrub 1.5–2 m. high, leaves dull pale green above, grey beneath, flowers purple, very fragrant, 2150 m., July 3, 1946, *16646*; ibid., plentiful in forest regrowth, shrub 3–6 m. high, leaves rugose, grey beneath, branches erect, flowers lilac-coloured, fragrant, 1750 m., July 5, 1946, *16665*. North Nyasa District: Nyika Plateau, frequent on forest edges and in second-growths, tree or shrub up to 8 m. tall, leaves pale green above, grey beneath, flowers pale lilac, very fragrant, 2440 m., Aug. 11, 1946, *17166*. Uganda to South Africa.

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